SUPPLEMENTARY MATERIAL FOR PIONEERING WOMEN IN AMERICAN MATHEMATICS: THE PRE-1940 PHD'S

JUDY GREEN AND JEANNE LADUKE

Introduction

This document is a supplement to the book *Pioneering Women in American Mathematics: The Pre-1940s PhD's*, published by the American Mathematical Society and London Mathematical Society. The entries in this supplement are expanded versions of the 228 biographical entries in the book. As in the book, entries are in alphabetical order according to the name most often used professionally. Each entry includes a more extensive biographical narrative than is in the book, a list of organizational affiliations of the subject, a list of works by the subject (which in most cases is complete) as well as sources of reviews for the items and talks presented to professional meetings. Each entry also includes a list of references to the subject and a section on other sources used by the authors. A short description of the book as well as links to the preface, preview material, and the table of contents can be found at the AMS bookstore webpage for the book.

Although a selected bibliography and a list of abbreviations are available, some additional explanations are necessary at this point. Several abbreviations or shortened forms appear sufficiently frequently that they are noted here. As we indicate in the preface to the book, several sources were particularly useful. They include *American Men of Science* (AmMSc), *American Men and Women of Science* (AmMWSc), and the reviewing journals *Jahrbuch über die Fortschritte der Mathematik* (JFM), *Revue Semestrielle des Publications Mathématiques* (Rev. semestr. publ. math.), *Zentralblatt für Mathematik* (Zbl), and *Mathematical Reviews* (MR).

Some citations that appear in Other Sources are abbreviated as indicated on our List of Abbreviations. When the full citation appears in the Selected Bibliography the form of the citation is "author, title." Items that appear frequently in Other Sources and that may require explanation are: Owens Papers, Owens questionnaire(s), Smithsonian questionnaire, Smithsonian meeting tapes, authors' questionnaire, Religious Women in Mathematics Survey, and Williams Papers.

For the Owens material: A study of American women mathematicians was undertaken by Helen Brewster Owens in the late 1930s. In 1937 and again in 1940, Owens sent questionnaires to American women mathematicians asking for basic biographical and bibliographical information. Any such questionnaire is cited as "Owens questionnaire." The questionnaires that Helen Owens collected in 1937 and 1940 are in folders 134–38 of Series IV, Women in Mathematics and the Sciences, Helen Brewster Owens Papers, Schlesinger Library, Radcliffe Institute, Harvard University. Other material used in the Owens Papers is also in Series IV of the same collection.

For the Smithsonian material: A day-long meeting honoring American women who received PhD's in mathematics prior to World War II was held on August 31, 1981, and was sponsored by the Division of Mathematics of the Smithsonian Institution. The division's curator, Uta C. Merzbach, presided at the meeting; she was assisted by the authors. In connection with the meeting, and for some time afterward, questionnaires were collected, and audiotapes were made at the meeting. These are designated "Smithsonian questionnaires" and "Smithsonian meeting tapes" and are in the Early Women Doctorates Collection (number 2006.3037), Mathematics Collections, Division of Information Technology and Communications, National Museum of American History, Smithsonian Institution. The authors later collected questionnaires that were not related to the Smithsonian projects. They are designated "authors' questionnaires" and are in the authors' possession.

Lists of the questionnaires and photographs collected by the Smithsonian in connection with the 1981 meeting can be found in the section Honoring American Women in Mathematics: Pre-World War II PhD's of the online National Museum of American History (NMAH) object group Women Mathematicians and NMAH Collections. All but one of the other sections in this object group are related to women with pre-1940 PhD's in mathematics.

The Religious Women in Mathematics Survey was conducted in the early 1980s by Sister Miriam P. Cooney, of Saint Mary's College in Indiana, and Sister M. Stephanie Sloyan, of Georgian Court College in New Jersey, who shared some of their results with us.

Mary Elizabeth Williams collected information about nineteenth- and early twentieth-century American women in mathematics and was in the process of writing biographies of these women at the time of her death in 1976. Her papers include the partial results of her 1970s study for which she had collected information about thirty-four American women mathematicians, most of whom did not have PhD's in mathematics. These papers, designated "Williams Papers" in Other Sources, are the Mary Elizabeth Williams Papers, 1933-1976, Schlesinger Library, Radcliffe Institute, Harvard University.

Last modified: January 13, 2016.

List of Entries

A

ADAMS, Rachel (Blodgett). October 13, 1894–January 22, 1982.
Wellesley College (BA 1916), Radcliffe College (MA 1919, PhD 1921).

Rachel Blodgett was born in Woburn, Massachusetts, the eldest of three children of Mabel Edith (Owen) (b. 1874) and William Edward Blodgett (b. 1864), natives of Massachusetts. Her parents did not attend college; her father was treasurer of a company that manufactured tiles and was at one point mayor of Woburn. Her brother, Malcolm, was born in 1897 and her sister, Hope, was born in 1903.

After attending public grammar school 1899–1908 and Woburn High School 1908–12, Rachel Blodgett entered Wellesley College, where several relatives of her father had studied in the early years of the college. Blodgett majored in mathematics and Latin, was a member of the Shakespeare Society, and played cornet in the Wellesley College symphony orchestra. She was a Wellesley scholar 1914 and a Durant scholar 1915.

Following her graduation from Wellesley in 1916, Rachel Blodgett attended Harvard summer school in 1916 and was employed 1916–18 as a teacher of mathematics (mathematics mistress) at Miss Edgar's and Miss Cramp's School in Montreal, Quebec. The next three years she did graduate work in analysis at Radcliffe College, where she held an Edward Austin scholarship at least two years and a Mary E. Horton fellowship her last year, 1920–21. She earned her master's degree in 1919 and her doctorate in 1921. While there she had her closest contact with Professors W. F. Osgood and O. D. Kellogg, although it is not clear under whose direction she wrote her dissertation. She was instructor of mathematics at Wellesley during the academic year 1921–22.

Rachel Blodgett married Clarence Raymond Adams on August 17, 1922, in Eden Park, Rhode Island. C. R. Adams was born on April 10, 1898, in Cranston, Rhode Island. He was a 1918 graduate of Brown University, earned master's degrees from Brown and Harvard University, and completed his PhD in mathematics in 1922 under George David Birkhoff at Harvard. The newly married couple were in Rome and Göttingen 1922–23 while C. R. Adams was a Sheldon traveling fellow from Harvard.

Upon their return in 1923 Rachel and C. R. Adams moved to Providence, Rhode Island, where he was to spend his career in the mathematics department at Brown. He became full professor in 1936 and served as department chair from 1942 to 1960. He was active in a number of professional mathematical societies; in particular, he served as councillor and vice president of the AMS and was on the board of governors of the MAA. He was starred in *American Men of Science* in 1933. C. R. Adams retired as professor emeritus from Brown in 1965 and died on October 15, 1965. There were no children of the marriage.

Rachel B. Adams was a member of the MAA for a year after her marriage and served as a tutor at Radcliffe from 1926 to 1941. During these years the other mathematics tutor at Radcliffe was Florence Curtis Graustein. At least through the 1920s Adams continued her interest in integral equations. G. C. Evans of Rice Institute used information from her dissertation in an extensive review of a book

on linear integral equations for the *Monthly* in 1927. She presented her results to the AMS in 1926 and published them in the *American Journal* in 1929.

Rachel Adams was a Baptist and a Republican and was active in and served as an officer of a number of community organizations, including the First Baptist Church Women's Society, the YWCA, the Brown Faculty Ladies, the Handicraft Club of Providence, the Weavers Guild, the Providence Art Club, a literary society, an amateur theatrical group, and the Rhode Island Wellesley Alumnae. During World War II she was registered in Washington with the National Roster of Scientific Personnel, although there is no evidence of her being asked to do scientific work at that time. She was, however, engaged in other war-time work such as making dressings.

During their marriage Rachel and C. R. Adams traveled extensively by automobile in the United States and Europe. After her husband's death she continued her community work and served as treasurer for several years and on the board of directors of the Home for Aged Women (later the Tockwotton Home) in Providence.

Adams lived in her family home in Providence for more than forty years until 1980, when she moved to the Tockwotton Home just over a year before her death there at age eighty-seven in 1982. She was survived by her sister, Hope Blodgett Stebbins, and was buried in Swan Point Cemetery in Providence. Following her death, a bequest from her estate was used to establish the Blodgett Fund at Wellesley, with the income to be used for scholarships.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Theses and dissertation:
1920 [Blodgett, R.] Invariants of systems of conics. First minor thesis, Radcliffe College.
1921a [Blodgett, R.] The principles of least actions, varying actions, and least constraint in dynamics. Second minor thesis, Radcliffe College.
1921b [Blodgett, R.] The determination of the coefficients in interpolation formulae; and A study of the approximate solution of integral equations. PhD dissertation, Radcliffe College. See also **1929**.

Publication:
1929 On the approximate solution of Fredholm's homogeneous integral equation. *Amer. J. Math.* 51:139–48. Published version of PhD dissertation. Review: *JFM* 55.0231.02 (G. Feigl). Presented by title as "The solutions of Fredholm's homogeneous integral equation as functionals of the kernel" to the AMS, New York City, 1 May 1926; abstract: *Bull. Amer. Math. Soc.* 32:309 #14.

References to: AmMSc 4–8, 9P–10P; AmWom 1935–40; WhoEast 1930.
"Rachel B. Adams." (Obituary) *Providence Sunday Journal*, 24 Jan 1982.

Other sources: Owens questionnaire 1937; Wellesley College Alumnae Association; communications with Harvard University Archives, Providence Public Library, and Wellesley College Archives; communication with Schlesinger Library, Radcliffe Institute, Harvard University (Radcliffe College student files, 1890–1985); US Census 1900, 1910, 1920, 1930 MA, 1930 RI, 1930 NY; SSDI.

Last modified: June 21, 2011.

AITCHISON, Beatrice. July 18, 1908–September 22, 1997.
Goucher College (BA 1928), Johns Hopkins University (MA 1931, PhD 1933), University of Oregon (MA 1937).

Beatrice Aitchison was born in Portland, Oregon, the daughter of Bertha Beatrice (Williams) (1877–1935) and Clyde Bruce Aitchison (1875–1962). Her parents were natives of Iowa and married in 1906. She had a younger brother, Clyde Bruce Aitchison Jr. (1909–1969), who became a lawyer. Her mother was a musician and singer; her father was a lawyer who had a distinguished career serving on state and federal regulatory commissions and in private practice.

Clyde B. Aitchison, her father, earned a BSc from Hastings College in 1893, an MA from the University of Oregon in 1915, and a PhD in economics from American University in 1932. After completing his undergraduate work, he studied law in a private law firm in Iowa and was admitted to the Iowa bar in 1896. He moved to Oregon in 1903 and served on various regulatory commissions there until 1916. The family moved to Washington, D.C., when he became solicitor for the National Association of Railway Commissioners in 1916. In 1917 he became a member of the Interstate Commerce Commission (ICC) and served as its chairman four times before his retirement in 1952. He then had a private law practice until his death. He had an extensive record of writings, lectured at American University for a dozen years, and received numerous awards, including honorary LLD degrees from Hastings College and the University of Oregon. After his first wife's death, he married Ada Chenoweth McCown (1886–1944), a political scientist who had earned a PhD from Columbia University in 1927 and was serving as a researcher in legislative reference at the Library of Congress just before their marriage in 1936.

Beatrice Aitchison attended private school for four years in Portland before the family moved to Washington, D.C., where she attended public schools. She graduated with honors from Central High School in Washington shortly before her sixteenth birthday. She reported in 1981, "I think that high school was very important to me .... I had two excellent instructors who were probably just out of college ... and who were very excited about teaching" (Smithsonian meeting tapes). She then attended Goucher College 1924–28. After graduating from Goucher in 1928, she worked for a year in New York City for the Metropolitan Life Insurance Company as its first female actuarial clerk. For eleven months in 1928–29 she took special courses while working in New York, and she passed the first four parts of the examinations of the American Institute of Actuaries and of the Actuarial Society of America in April 1929. Aitchison reported later that at just barely twenty she "couldn't cope with New York City," so she resumed her study of mathematics in October 1929 at Johns Hopkins University (Smithsonian meeting tapes). From 1929 until 1932 she was a University scholar at Johns Hopkins and earned a master's degree in 1931 and a PhD in 1933.

Since the Great Depression was in full force at the time of her doctorate, jobs were difficult to find. Aitchison recalled, "I applied to 145 colleges and universities my last spring at Hopkins .... Someone whom I didn't know but knew my background held my application thinking she might have an opening at Westhampton College [the college for women] at the University of Richmond. Sure enough, [one of the faculty members] got really sick and so on about three days notice I was down there teaching for one semester" (Smithsonian meeting tapes). After that semester as

acting associate professor, she served as lecturer in statistics at American University in Washington, D.C., 1934–35. She also wrote in her 1981 Smithsonian questionnaire that American University "invited [her] to 'help' with statistics for 'experience' and no pay." She did, however, get credit for a graduate course in history of economic thought.

Aitchison's mother died in the spring of 1935, and she returned to Oregon where she took a University of Oregon extension course in Portland in principles of economics. In 1936 she was a field supervisor for the Oregon Historical Records Survey of the WPA in Portland before spending the academic year 1936–37 at the University of Oregon. In 1937 she received her second master's degree, this one with honors in economics. When she returned to Washington in 1937, she again lectured in statistics at American University, continuing to do so through 1938–39; she also served as a member of the faculty of the graduate school of the US Department of Agriculture. Starting in 1938 Aitchison held temporary assignments at the ICC and while in Washington she lived in her father's house near Dupont Circle. She was one of thirty-five residents of the area interviewed in 1984 and 1985 for a master's thesis, "Slices of the Pie: Black and White Dupont Circle from the 1920's to the 1950's" by Mara Cherkasky.

Aitchison returned to the University of Oregon as an economics instructor in 1939. She continued her temporary assignments with the ICC during the summers and prepared a report for its Bureau of Statistics that was published in 1941. At the beginning of 1942 Aitchison resigned her position in Oregon and began her long and distinguished career as a transportation economist with the US government. Her first position was with the ICC, where from 1942 to 1948 she advanced from junior to senior statistician, and from 1948 until 1951 she served as principal transportation economist. During her service with the ICC, Aitchison continued to teach as a lecturer in statistics at American University 1942–44. From 1942 until 1945, she was a consultant and head of traffic analysis for the Office of Defense Transportation, and in 1950 she was assigned from the ICC as a consultant to the director of military traffic of the Department of Defense. In 1946 Aitchison was a founding member of the American Society of Traffic and Transportation (now the American Society of Transportation and Logistics).

Aitchison left the ICC in 1951 and worked until 1953 as director of the Transport Economics Division of the Office of Transportation at the US Department of Commerce. After this post was abolished in 1953, she worked for the US Post Office until she retired in July 1971. Aitchison was director of transportation research 1953–58, director of transportation research and statistics 1958–67, and director of transportation rates and economics in her last position 1967–71. After her retirement she was self-employed as a consultant in transportation issues.

In the period from the mid-1940s to the 1970s, Aitchison conducted studies on transportation issues, testified before numerous regulatory agencies, and gave many talks on postal history and transportation at institutes and meetings of various transportation groups and postmasters' conventions around the country. In addition to technical reports listed below, Aitchison wrote at least five others, two in the late 1950s and three in the early 1970s, that do not appear to be available in any library.

During and after her government career, Aitchison received many honors. Goucher presented her with an Alumnae Achievement Citation in 1954 and awarded her

an honorary DSc in 1979. In 1961 she was one of six career women in government chosen to receive the first annual Federal Woman's Award given by the Civil Service Commission. As a consequence of receiving this award, she was a member of the Federal Woman's Award Study Group on Careers for Women, a small group of award recipients who were asked by President Lyndon Johnson to make a study of careers for women. The group's recommendations resulted in an amendment to the executive order banning discrimination in government employment to include sex discrimination.

In receiving the Federal Woman's Award she was cited for her leadership in research and training in transportation economics and traffic management. It was noted that as a result of her work, "the postal service was able to realize millions of dollars in savings." Her obituary in the *Washington Post* reports that "in the 1960s, she supervised a five-year study leading to renegotiation of contracts with air carriers, saving the government an estimated $50 billion a year."

In 1970 Aitchison was honored by the National Civil Service League with the Career Service Award as one of the top ten government workers of the year, the only woman in the group. She was named an Alumni Fellow of the College of Arts and Sciences at the University of Oregon in 1996. The following year the Johns Hopkins Alumni Association honored her with a Woodrow Wilson Award for outstanding government service noting that she was one of the highest ranking women in the federal service at the time of her retirement.

In addition to consulting after her retirement, Aitchison spent significant time in volunteer work with the elderly. She received a certificate with honors for a paralegal training program for seniors at George Washington University's Institute of Law and Aging where she studied in 1977–78. In the early 1980s she indicated that she spent forty to fifty work days a year doing income taxes for the elderly with the IRS Volunteer Income Tax Assistance (VITA) Program.

Among her interests were music, photography, sewing, and traveling. The *Washington Post* obituary states that she had studied the mamba and the samba at Fred Astaire's dancing school and that "she also traveled widely, often by tramp steamer, to such locations as the South Pacific and Antarctica."

Beatrice Aitchison described her political affiliation as mainly independent. She was a member of the Daughters of the American Revolution, served on a hospital board, and was active in the Goucher Club of Washington, serving as treasurer and president. She also was a trustee of Goucher College 1969–72.

She was an active Episcopalian serving in a variety of positions. In 1963 she was the first woman elected to the vestry of Epiphany Episcopal Church in Washington, D.C. She held many other positions in the church, including positions on the vestry of St. Margaret's Episcopal Church in Washington, D.C., in the 1980s. Altogether she sang in church choirs from the time she was a young teen until about two years before her death.

She was very supportive of the schools where she had received her education. Summer grants for junior Goucher College faculty are available through the Beatrice Aitchison '28 Non-Tenured Faculty Professional Advancement Fund. Aitchison was also generous in her contributions to the Goucher library, allowing the librarian to select about eighty volumes from her personal library in 1963. In 1994 she established the Aitchison Public Service Fellowship, now called the Aitchison Public Service Undergraduate Fellowship in Washington, at Johns Hopkins.

Collections of her papers are deposited at the Schlesinger Library, Radcliffe Institute, Harvard University, and at the University of Oregon. Those at the Schlesinger Library deal with the period 1943–56 and contain articles and speeches by her as well as news releases concerning her appointment to the US Post Office. The more extensive collection at Oregon covers the period 1946–70 and includes records of the Civil Aeronautics Board, the Interstate Commerce Commission, and the Post Office Department, as well as speeches and addresses.

According to her obituary in the *Washington Post*, Beatrice Aitchison died of congestive heart failure on September 22, 1997, at Sibley Memorial Hospital in Washington, D.C. She left no immediate survivors. The Social Security Death Index lists her death date as September 21, 1997.

Organizational affiliations: AMS, MAA, ASA (fellow), IMS, AAAS (fellow), Amer. Econ. Assoc., Amer. Soc. Traffic and Transportation, Econometric Soc., Transportation Assoc. Amer., Transportation Res. Forum, AAUW, Phi Beta Kappa, Sigma Xi.

Theses and dissertation:

1931 Concerning regular accessibility. MA thesis, Johns Hopkins University, directed by Gordon Thomas Whyburn. Typescript. See also **1933** in **Publications**.

1933 On mapping with functions of finite sections. PhD dissertation, Johns Hopkins University, directed by Gordon Thomas Whyburn. Typescript. Printed version, 1935, reprinted from *C. R. Soc. Sc. Varsovie* 27:130–46.

1937 Mathematical characteristics of certain important scales of class-rates. MA thesis, University of Oregon.

Publications:

1933 Concerning regular accessibility. *Fund. Math.* 20:117–25. Reviews: *JFM* 59.0574.02 (H. v. Caemmerer); *Zbl* 007.08205 (G. T. Whyburn). Presented by title to the AMS, Minneapolis, MN, 9 Sep 1931; abstract: *Bull. Amer. Math. Soc.* 37:527 #265.

1935 On the mapping of locally connected continua into simple arcs. *C. R. Soc. Sc. Varsovie* 27:130–46. Published version of PhD dissertation. Reviews: *JFM* 61.1369.02 (K. Borsuk); *Zbl* 012.12703 (G. T. Whyburn). Presented as "Concerning the mapping of locally connected continua onto simple arcs" to the AMS, Los Angeles, 2 Sep 1932; abstract: *Bull. Amer. Math. Soc.* 38:800 #231.

1953 (Compiler and editor) with G. L. Wilson. Traffic and transportation flow analysis: papers and discussion, panel meeting, American Economics Association and American Statistics Association, Chicago sessions, Dec 1952.

1969 Bureaucratic May Day or Cokes to Alaska and love letters to Viet Nam. *Goucher Quarterly* (Summer): 41–43.

Selected technical reports:

1941 Preliminary examination of factors affecting the demand for rail passenger travel. Washington, DC: Interstate Commerce Commission, Bureau of Statistics, Statement no. 4129, file 61–C–3. Microfilm: 1958. Berkeley: Univ. of California Photographic Service.

1943a A description of the principal class rate scales prescribed by the Interstate Commerce Commission: together with an analysis of their progression for distance, and a method of scale construction. Washington, DC: Interstate Commerce Commission, Bureau of Transport Economics and Statistics, Statement no. 4351.

1943b [no author listed] Territorial movement of carload freight [traffic of steam railways] on May 27 and September 23, 1942. Washington, DC: Interstate Commerce Commission, Bureau of Transport Economics and Statistics. Docket no. 28300. Class rate investigation.

1946 Weight density and value as factors in freight classification. Washington, DC: Interstate Commerce Commission, Bureau of Transport Economics and Statistics, Statement no. 469.

1953 [no author listed] Charges for private use of federally provided transportation facilities and services: a staff study of the principles involved in federal user charges. Washington, DC: US Dept. of Commerce, Office of Transportation.
1956 [no author listed] Report of the departmental committee on expedited first-class mail. Washington, DC: US Post Office Department. General research project no. 10. Editor and author of several chapters.
1964 Productivity in purchase of transportation for mail, fiscal years 1953–1962. In "Case study of Post Office productivity. Report for the Bureau of the Budget." Summary in "Measuring productivity of federal government organizations." Washington, DC: US Bureau of the Budget. App. V–1, 234.

Abstracts not listed above:
1932 Regular accessibility. *Amer. Math. Monthly* 39:509 #7. Presented to the MAA, College Park, MD, 7 May 1932.
1933 On mapping with functions of finite sections. *Amer. Math. Monthly* 40:189–90 #1. Presented to the MAA, Baltimore, MD, 3 Dec 1932.

Presentation not listed above:
Elasticity of demand for rail passenger travel. Presented to a meeting of the Pacific Coast Econ. Assoc., Palo Alto, CA, 27–28 Dec 1940.

References to: AmMSc 6–8, 9S–11S; AmMWSc 12S–13S; AmWom 1935–40; InWom SUP; WhAm 13; WhoAmW 1–8, 10–17; WhoE 22; WhoGov 1; WhoWor 9–10.
"Army Calls 9,565 More Officers; Chaplains, Aviation Men Summoned." *New York Times*, 19 Sep 1950.
" 'Queen Bea' of Her Profession." *Goucher Alumnae Quarterly*, Summer 1952, 16.
"Awards Go to Six as Career Women." *New York Times*, 13 Feb 1961.
"She Keeps the Mails Moving." *Washington Post*, 19 Feb 1961.
"6 Career Women in Government Get First Civil-Service Awards." *New York Times*, 25 Feb 1961.
"10 Winners Named for Service Award." *New York Times*, 22 Mar 1970.
"Waste-Watcher." *Forbes*, 1 Jul 1970.
"Depression Era Alumna Recalls Lengthy Career." *Casement*, Alumni Newsletter for the College of Arts and Sciences, University of Oregon, Spring 1995: 6.
Pearson, Richard. "Retired Postal Official Beatrice Aitchison Dies." *Washington Post*, 29 Sep 1997.

Related manuscript materials:
Beatrice Aitchison Papers, 1943–1956. Schlesinger Library, Radcliffe Institute, Harvard University.
Beatrice Aitchison Papers, 1946–1970. University of Oregon Libraries.

Unpublished interview:
Aitchison, Beatrice. Interview by Myra Cherkasky, 11 April 1984, Washington, DC. Oral History Project 10: Dupont Circle "Slices of the Pie," Oral History Research Center, Martin Luther King Jr. Memorial Library, District of Columbia Public Library. Transcript.

Other sources: MA thesis vita 1931; PhD dissertation vita 1933; Owens questionnaire 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; Johns Hopkins University Archives; Society of Actuaries Library; Cockey, "Mathematics at Goucher"; NatCAB 47 (Aitchison, Clyde Bruce); WhAm 4 (Aitchison, Clyde Bruce); US Census 1910 OR, 1920, 1930 DC; SSDI.

Last modified: January 8, 2016.

ALDEN, Marjorie (Leffler). August 29, 1909–October 5, 2000.
Miami University (BA 1930), Ohio State University (MA 1932, PhD 1934).

Marjorie Leffler was born in Kyle, Ohio, the eldest of four children of Stella Eugenia (Durbin) and William Homer Leffler. Her parents were both born in Ohio, in 1882 and 1876, respectively, and married in about 1907. In 1910 the Lefflers were living with Marjorie's maternal grandparents, and William Leffler's occupation was described as commercial traveler. In 1920 there were four children: Marjorie; two brothers, Homer (1913–1977) and Norman (1916–1997); and a sister, Ruth (1918–2006). The family farmed their own land in Butler County, Ohio.

Marjorie Leffler received her primary education in the local township school and her secondary education in the high school of Hamilton, Ohio. In 1930 she graduated from Miami University in neighboring Oxford, Ohio, magna cum laude, with honors in mathematics and with general honors. As an undergraduate Leffler was involved in many activities. These included several sports (hockey, soccer, baseball, and track); classical club; debate; Alethenai, a national literary society; student-faculty council; disciplinary board; and the year book. She was elected to the honor societies Phi Beta Kappa, Kappa Delta Pi (education), Tau Kappa Alpha (journalism), and to Mortar Board.

All of Leffler's graduate work was done at Ohio State University in Columbus. In 1931 she was awarded a university scholarship in mathematics, which she held for two years. She earned a master's degree in 1932; the following year she was an assistant in the university high school while continuing her work for the PhD. She also was treasurer of the local chapter of Pi Mu Epsilon that year. Both her master's thesis and her doctoral dissertation were in analysis and were directed by Tibor Radó.

After completing her work at Ohio State in 1934, Leffler took a position as tutor and instructor at Mills College in California for 1934–35. On December 20, 1934, Marjorie Leffler married Howard Holston Alden (1908–1998), also of Ohio. He had received a BS from Carnegie Institute of Technology in 1930 and an MA in 1931 and a PhD in 1933 in mathematics from Ohio State. In July 1933, he was looking for jobs; one inquiry was to the president of the University of Saskatchewan in which he indicated that he was seeking a permanent position in Canada and that he had had four years of teaching experience at the Carnegie Institute of Technology and at Ohio State.

Marjorie Leffler Alden's subsequent academic positions were at the same institutions as her husband's, but at lower ranks. Howard H. Alden was head of the mathematics department at New Mexico Military Institute, a junior college in Roswell, from 1934 to 1943; was associate professor at the University of Wyoming 1945–46; and returned to Ohio State University as assistant professor in 1946. He was also involved with jet propulsion research during World War II and was a chief engineer working under Robert H. Goddard 1942–45. During this period, Marjorie L. Alden was an instructor at New Mexico Military Institute 1936–43, instructor at the University of Wyoming 1945–46, and instructor at Ohio State starting in 1946. Howard Holston Alden was promoted to associate professor at Ohio State in 1948, while Marjorie Leffler Alden remained as instructor. Both resigned from the university in June 1956, after which it appears they left Columbus.

Marjorie Leffler Alden did not publish her thesis or her dissertation. However, G. E. Albert, a 1938 PhD from the University of Wisconsin who was then at Ohio State, used a proof that appeared in her master's thesis in a 1943 paper, "The closure systems of orthogonal functions," in the *Monthly*. This paper appeared before the Aldens returned to Ohio State.

The Aldens lived for a time in Mesa, Arizona, before moving to California. For several years in the 1980s and 1990s they lived in a retirement home in La Mesa, California. Howard Alden died March 1, 1998, at eighty-nine. After an illness of more than a decade, Marjorie Alden died of cardiorespiratory arrest in Grossmont Hospital in La Mesa at age ninety-one in 2000. Her ashes were scattered at sea.

Organizational affiliations: Phi Beta Kappa, Pi Mu Epsilon.

Thesis and dissertation:
1932 [Leffler, M.] Some elementary aspects of Fourier series. MA thesis, Ohio State University, directed by Tibor Radó. Typescript.
1934 [Leffler, M.] A lemma in potential theory. PhD dissertation, Ohio State University, directed by Tibor Radó. Typescript. Microfilm: 1952. Abstract: *Abstracts of Doctoral Dissertations.* [Graduate School, Ohio State University] 16:86–96. See also **1933**.

Abstract not listed above:
1933 [Leffler, M.] A lemma in potential theory. *Bull. Amer. Math. Soc.* 39:876 #322. Presented to a meeting of the AMS, Cincinnati, OH, 1–2 Dec 1933.

References to: AmMSc 6–7.

Other sources: PhD dissertation vita 1934; communication with Barbara Flory, niece of Marjorie Alden; Miami University Archives; Ohio State University Archives; University of Saskatchewan Archives; US Census 1900, 1910, 1920, 1930 OH; California death certificate; SSDI.

Last modified: July 19, 2009.

ALLEN, Bess (Eversull). May 18, 1899–March 18, 1978.
University of Cincinnati (BA 1921, MA 1922, PhD 1924).

Bess Marie Eversull was born in Elmwood Place, a village adjacent to Cincinnati, Ohio, the first of two daughters of Olive (Magrew) (1872–1954) and Warner Solomon Eversull (1865–1944), both of Ohio. Her parents had married in 1896, and the younger daughter, Edna (1901–1955), was born two years after Bess. Warner Eversull was principal and later superintendent of a public school in the area.

Bess Eversull attended Woodward High School in Cincinnati before enrolling at the University of Cincinnati where she received all of her formal postsecondary education. She held a Washburn scholarship the first two years of her undergraduate work and graduated in 1921 with a combined major in mathematics and English and a minor in French.

Eversull continued her studies at Cincinnati until she completed the work for her doctorate with a minor in physics. She was a Baldwin fellow 1921–23, a Taft fellow 1924, and assisted and taught intermittently. Both her 1922 master's thesis and her 1924 doctoral dissertation examined triple Fourier series, and each was published the year she received the degree. She was the first doctoral student of Charles N. Moore and was the third person and the first woman to earn a doctorate in mathematics at Cincinnati.

Bess Eversull was an instructor at Smith College 1924–27. In October 1927 she married Charles Easton Allen (1899–1975), and within a year they were living in Detroit, where by 1930 Charles Allen was a civil engineer working as a building inspector for the City of Detroit. Nearly twenty years after her marriage Allen indicated in a job application that she had no children and that she had done only volunteer work, mostly non-mathematical, since her marriage, except during the war. She worked as a mathematician for the Jam Handy Organization, which made films for the armed services, from May 1942 until August 1943. Her volunteer activities consisted of settlement work, YWCA board work, tutoring high school and college students, and tutoring at the veterans' hospital; in 1945 she taught in the New Boston, Texas, high school as a substitute for two months.

In February 1947 Allen resumed her professional work by taking a position as a regular substitute instructor at Wayne University (now Wayne State University) in Detroit. She continued there as instructor 1948–50, assistant professor 1950–59, associate professor 1959–64, and associate professor emeritus after her retirement in 1964.

While at Wayne State University she taught elementary and beginning graduate courses, was a regular attendee at department colloquia, prepared catalogue material, was in charge of placement examinations, and supervised part-time instructors. The department recommendation for her promotion to associate professor contains the following observations: "In her unusual devotion to work in the classroom and in interest in her students, Mrs. Allen sets an example for the rest of the staff.... The candidate is an excellent teacher.... She spends more time in giving individual assistance to students in and out of the class than any other member of the department.... Without Mrs. Allen's presence in the Math Department, much of the essential detailed work would not be done" (Wayne State University Archives).

Allen's activities outside the department included serving as a member of the university honors convocation committee, as secretary of the WSU chapter of Phi

Beta Kappa, as liaison member between WSU and the AAUW, as director of the Faculty Women's Club, and as sponsor of the WSU chapter of Delta Omicron, a national music fraternity. She often attended MAA meetings and wrote several reviews for the *Monthly*. Professional affiliations included the Industrial Mathematics Society, Detroit, and the Michigan Academy of Science, Arts, and Letters. After her retirement from Wayne State in 1964, she taught for a few years in the late 1960s at the Detroit Institute of Technology.

Charles Allen died in 1975, and Bess Allen died at her home in Detroit, Michigan, in 1978, two months before her seventy-ninth birthday. After cremation her remains were interred in the Evergreen Cemetery in Detroit.

Organizational affiliations: AMS, MAA, AAAS, AAUW, Phi Beta Kappa.

Thesis and dissertation:
1922 [Eversull, B. M.] On the convergence factors in triple series and the triple Fourier's series with an application to a physical problem in the flow of heat. MA thesis, University of Cincinnati. See also **1922** in **Publications**.
1924 [Eversull, B. M.] The summability of the triple Fourier's series at points of discontinuity of the function developed. PhD dissertation, University of Cincinnati, directed by Charles Napoleon Moore. Typescript. Printed version, 1924, reprinted from *Trans. Amer. Math. Soc.* 26:313–34.

Publications:
1922 [Eversull, B. M.] On convergence factors in triple series and the triple Fourier's series. *Ann. of Math.* 2nd ser., 24:141–66. Reviews: *JFM* 49.0207.04 (E. Hille); *Rev. semestr. publ. math.* 31, pt. 2: 19 (W. A. Wythoff). Presented as "On convergence factors in triple series and the triple Fourier series" to the AMS, Chicago, 14 Apr 1922; abstract: *Bull. Amer. Math. Soc.* 28:289 #5.
1924 [Eversull, B. M.] The summability of the triple Fourier series at points of discontinuity of the function developed. *Trans. Amer. Math. Soc.* 26:313–34. Published version of PhD dissertation. Reviews: *JFM* 50.0205.02 (J. Radon); *Rev. semestr. publ. math.* 32, pt. 1: 14–15 (P. Mulder). Presented as "On the summability of the triple Fourier series at points of discontinuity of the function involved" to the AMS, Cincinnati, OH, 28 Dec 1923; abstract: *Bull. Amer. Math. Soc.* 30:219 #2.
1957 Review of *Fun with Mathematics*, by J. S. Meyer. *Amer. Math. Monthly* 64:684.
1959 Review of *An Introduction to Mathematics*, by A. N. Whitehead. *Amer. Math. Monthly* 66:829.
1960 Review of *Elementary Analysis, a Modern Approach*, by H. C. Trimble and F. W. Lott, Jr. *Amer. Math. Monthly* 67:1045.

Reference to: AmMSc 4.

Other sources: Owens questionnaire 1937; communication with Wayne State University Archives; US Census 1900, 1910, 1920, 1930 OH, 1930 MI; Michigan death certificate.

Last modified: July 19, 2009.

ALLEN, Florence E. October 4, 1876–December 31, 1960.
University of Wisconsin (BL 1900, ML 1901, PhD 1907).

Florence Eliza Allen was born in Horicon, Wisconsin, the second child and only daughter of Eliza (North) (b. 1848), of Wisconsin, and Charles Allen (b. ca. 1836), a native of New York. Her parents married in 1866. Her father was a lawyer, who, it appears, died in 1890. In 1900, she, her mother, and her brother, Charles Elmer Allen (1872–1954), were living in Madison, Wisconsin.

Florence Allen was a mathematics major as an undergraduate in the College of Letters and Science at the University of Wisconsin. She was active in Castalia, a literary society for women promoting interest in the fine arts, and served as secretary and president. She was on the executive board of the self government association, was on the yearbook board, and was a member of Delta Delta Delta social sorority. Florence Allen received her bachelor's degree in 1900, a year after her older brother, who had taught and worked as a court reporter before studying at Wisconsin. They shared the same address, presumably with their mother, from the fall of 1896 until 1902. Charles E. Allen received his PhD in botany in 1904 from the University of Wisconsin and was on the faculty there from 1901 to 1943, when he retired as professor emeritus. He had attained the rank of professor in 1909. During his distinguished career he published extensively, was editor-in-chief of *The American Journal of Botany*, was president of his professional associations, received an honorary doctorate from the University of Chicago, and was elected to the National Academy of Sciences.

Florence Allen stayed at Wisconsin as a resident graduate in mathematics and philosophy 1900–01 and received her master's degree in mathematics in 1901. She was an assistant in mathematics at Wisconsin in 1901–02 and then became an instructor of mathematics. She remained at that rank for forty-three years, even though she had obtained her doctorate with a dissertation in geometry in 1907 and published her dissertation in 1914 and two additional research articles in 1915 and 1927. She became an assistant professor in the fall of 1945, shortly before her sixty-ninth birthday. Her promotion came two years before she retired at the rank of assistant professor emeritus. During her years at Wisconsin, in addition to her regular teaching and committee responsibilities, she sometimes taught summer courses, and she was active in planning and reporting on reunions for her class of 1900 in the Wisconsin alumni magazine.

As part of her entry in the 1914 *Woman's Who's Who of America*, Allen indicated that she favored women's suffrage. In response to an inquiry by Helen Owens concerning the outlook for women doctorates in mathematics, Allen wrote on June 8, 1940:

> Of course there will always be some women who should go in for a Ph.D. – some because it will be an actual necessity to qualify them for one of the occasional – very occasional – openings in college and university positions, some because of the leisure they may have to follow a congenial pursuit. But on the whole I see no great encouragement to be had from past experiences and observation. I do not believe that there is or will be a great future for any but a few in this field. At present, it seems to me, as I look about this campus, that in all strictly academic fields (not those special to women) that

> there is a decided drop in the number of women engaged. That may be peculiar to this economic phase, but I look for it to continue for some time to come.

Florence E. Allen was a member of the Wisconsin Academy of Sciences, Arts and Letters and of the Congregational Church. She had lived at the same house on Lathrop Street in Madison for more than fifty years before her death at eighty-four in a Madison, Wisconsin, hospital in 1960. She was survived by a niece and two nephews and was buried in Oak Hill Cemetery in Horicon, Wisconsin.

Organizational affiliations: AMS, MAA, Phi Beta Kappa.

Thesis and dissertation:
1901 The Abelian integrals of the first kind upon the Riemann's surface $s = (z-a)^{\frac{5}{6}}(z-b)^{\frac{5}{6}}(z-c)^{\frac{2}{6}}$. ML thesis, University of Wisconsin, directed by Linnaeus Wayland Dowling.
1907 On the determination of cyclic involutions of order three. PhD dissertation, University of Wisconsin, directed by Linnaeus Wayland Dowling. Published version, 1914, reprinted from *Q. J. Pure Appl. Math.* 45:258–88.

Publications:
1914 The cyclic involutions of third order determined by nets of curves of deficiency 0, 1, and 2. *Q. J. Pure Appl. Math.* 45:258–88. Published version of PhD dissertation. Reviews: *JFM* 45.0817.03 (W. Fr. Meyer); *Rev. semestr. publ. math.* 23, pt. 1: 61–62 (W. van der Woude).
1915 A certain class of transcendental curves. *Rend. Circ. Mat. Palermo* 39:149–52. Reviews: *JFM* 45.0846.05 (H. Rademacher); *Rev. semestr. publ. math.* 24, pt. 1: 77 (J. de Vries).
1920 Review of *Commercial Algebra*, by G. Wentworth, D. E. Smith, and W. S. Schlauch. *Bull. Amer. Math. Soc.* 26:177–79.
1927 Closure of the tangential process on the rational plane cubic. *Amer. J. Math.* 49:456–61. Reviews: *JFM* 53.0622.03 (G. Haenzel); *Rev. semestr. publ. math.* 33, pt. 2: 5 (W. G. J. ten Pas).
1928 Unsigned obituary of L. W. Dowling in "Notes and News." *Amer. Math. Monthly* 35:448.

Abstract not listed above:
1919 On a class of sectrix curves. *Bull. Amer. Math. Soc.* 25:389 #4. Presented by title to a meeting of the AMS, Chicago, 28–29 Mar 1919.

References to: AmMSc 6–8, 9P; BioWMath; WomWWA.
"Florence Allen, Ex-U.W. Faculty Member, 84, Dies." *Wisconsin State Journal*, 1 Jan 1961.

Other sources: Owens questionnaire 1940; Owens Papers; University of Wisconsin Archives; NatCAB 42 (Allen, Charles Elmer); US Census 1880, 1900, 1910, 1920, 1930 WI.

Last modified: March 6, 2009.

ANDERSON, Mae Ruth. May 31, 1899–March 28, 1948.
Concordia College (BA 1920), University of Chicago (MA 1923, PhD 1936).

Mae Ruth Anderson was born near Westby, Wisconsin, the daughter of Ida (Berg) (1862–1942) and Norton Alfred Anderson (1862–1930), both natives of Wisconsin of Norwegian ancestry. Her parents married in about 1894; it was a second marriage for Ida Anderson and a first for Norton Anderson. In 1900 Ida Anderson had two surviving children of three born; her son from her first marriage was born in 1887 in South Dakota and was living with the family in Vernon County, Wisconsin, in 1900 but not in later census years. Norton Anderson was a merchant.

Sometime after 1910 Mae Ruth Anderson and her parents moved to Shelly in western Minnesota, where her father again owned a store. Anderson graduated from high school in Halstad, Minnesota, a few miles from Shelly, in 1916 before entering Concordia College in neighboring Moorhead, Minnesota.

When Anderson was at Concordia, 1916–20, the mathematics department consisted of two faculty members, one of whom was Martha Brennun, who in 1917 was the first woman to receive a bachelor's degree from Concordia. Brennun, a mathematics major, had started teaching immediately after her graduation. At Concordia, Anderson was a member of the Alpha Society, Concordia's major scholastic honor society, and was on the staff of the *Crescent*, the student newspaper. A fellow student of Anderson's was Ruth B. Rasmusen, who was at Concordia 1918–21 and who received her PhD from Chicago in 1936, as did Anderson.

After her graduation from Concordia in 1920, Anderson taught in high school in Gayville, South Dakota, for a year before beginning her master's work in mathematics at the University of Chicago in the fall of 1921. After six consecutive quarters, she received the MA in March 1923. She taught at Waldorf Junior College and Academy in Forest City, Iowa, from 1923 to 1928 and joined the faculty at Concordia College as instructor in 1928. She was promoted to assistant professor in 1929. While on the faculty at Concordia she resumed her graduate work at the University of Chicago by attending the summer quarters in 1929, 1932, 1934, and 1935. A leave of absence from Concordia College permitted her to be in residence at Chicago to finish her doctoral work from summer 1935 to summer 1936. Her replacement at Concordia that year was Emma Olson, a 1932 Chicago PhD recipient.

In 1937 Anderson was promoted from assistant to full professor and became head of the mathematics department at Concordia, positions she retained until her death. In addition to teaching mathematics, she taught some French and was noted for her tireless efforts to help students. Excerpts from Concordia College yearbooks of 1946 and 1947 convey a sense of her qualities: "Her obvious love of her subject, her patience and sense of humor instill a lasting respect in her students." "Her demands for work, thoroughness, concentration, and more work bring results." While at Concordia, Anderson was also active on the graduate scholarship committee. During World War II she was secretary of the Committee on Relations to the Armed Forces, a committee that wrote to former students who were in the war.

Mae Ruth Anderson died of leukemia in a Rochester, Minnesota, hospital at age forty-eight in 1948. Her bequest to the Trinity Lutheran Church in Moorhead reflects her involvement with that church as officer of the Senior Sunday School and active member of the Lutheran Daughters of the Reformation. Anderson's mother, who lived in Moorhead after being widowed, predeceased her in 1942. Anderson

was survived by an uncle and two aunts. Funeral services were held in Moorhead and in Shelly, where she was buried.

Organizational affiliations: AMS, Sigma Xi.

Thesis and dissertation:
1923 An inclined rotational pendulum. MA thesis, University of Chicago. Typescript.
1936 Representation as a sum of multiples of polygonal numbers. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, distributed by the University of Chicago Libraries.

References to:
"Dr. Mae R. Anderson, 48, of Concordia Faculty Dies." Unidentified newspaper clipping.
"Dr. Anderson Funeral to be Held Thursday." Unidentified newspaper clipping.

Other sources: PhD dissertation vita 1936; Owens questionnaire 1937; communication with Concordia College Archives; US Census 1900, 1910 WI, 1920, 1930 MN.

Last modified: October 24, 2008.

ANDERSON, R. Lucile. October 22, 1900–February 18, 1999.
Mount Holyoke College (BA 1922), Bryn Mawr College (PhD 1930).

Rose Lucile Anderson was born in Jamestown, New York, the second of three children of Anna (Ebel), born in Germany in 1870, and Charles J. Anderson, born in Sweden in 1867. Her father immigrated to the United States in 1868, her mother in 1873. Both were later naturalized. Her father was the proprietor of a machine shop. Her older sister, Ethel Louise (1897–1983), graduated from Mount Holyoke College in 1919, received a master's degree from Cornell University in 1920, and taught zoology at the University of Kentucky for about two years before her marriage to Lester S. O'Bannon of the mechanical engineering department. She was living in Texas at the time of her death. A younger brother, Charles J. Jr., was born in about 1906, attended Cornell, and died in his thirties.

R. Lucile Anderson attended Jamestown public schools including the Jamestown high school from which she graduated in 1918. She immediately entered Mount Holyoke College and graduated in 1922 with senior honors in mathematics. Anderson went directly to Bryn Mawr College for graduate work in mathematics. She was a graduate scholar in mathematics 1922–23, a resident fellow 1923–24, and a fellow by courtesy and holder of the '86 fellowship from Mount Holyoke 1924–25. In the spring of 1924 she was awarded the Mary E. Garrett European fellowship from Bryn Mawr, which she used for study at Cambridge University in England in 1925–26.

When Anderson returned from England she was hired as instructor of mathematics at the University of Rochester, where she remained for two years, 1926–28. In 1928 she began her long association with Hunter College. The following year, 1929–30, she was a graduate student and part-time instructor at Bryn Mawr College, where she completed her work for the PhD with a dissertation in analysis written under the direction of Anna Pell Wheeler and with a minor in physics.

In 1930 Anderson returned to Hunter, again as instructor until 1936, as assistant professor 1936–56, and as associate professor 1956–71. Starting in the mid-1950s she taught graduate courses and from 1964 served as advisor in the teacher education program. In a letter written in 1972 for the 50th reunion booklet of the Mount Holyoke Class of 1922 Anderson reported, "I retired in 1971 after teaching mathematics at Hunter College of the City of New York for more years than I care to admit. The years have been spiced with some travel – Mexico, Alaska, Europe; some sports – golf, hiking, figure skating; some theater when tickets can be obtained without too much effort. For the present, I still have an apartment in New York and no immediate plans for moving into a 'retirement community'" (Mount Holyoke College Archives).

Anderson was still living in her apartment on East 54th Street in New York City when she died at age ninety-eight in 1999. She was survived by five nieces and nephews and eighteen great-nieces and great-nephews. She was cremated and her ashes returned to her hometown of Jamestown, New York, where she had spent many of her summers.

Organizational affiliations: AMS, MAA, AAUP.

Dissertation:
1930 A problem in the simultaneous reduction of two quadratic forms in infinitely many variables. PhD dissertation, Bryn Mawr College, directed by Anna Pell Wheeler. Printed version, 1932, reprinted from *Ann. of Math.* 2nd ser., 33:229–60.

Publication:
1932 A problem in the simultaneous reduction of two quadratic forms in infinitely many variables. *Ann. of Math.* 2nd ser., 33:229–60. Published version of PhD dissertation. Reviews: *JFM* 58.0424.03 (F. Rellich); *Zbl* 004.25903 (T. H. Hildebrandt).

References to: AmMSc 6–7.
"Anderson, R. Lucile." (Death notice) *New York Times*, 20 Feb 1999.

Other sources: PhD dissertation vita 1932; Owens questionnaire 1937; communications with Ellen Cleveland (niece) and William B. O'Bannon (nephew); Mount Holyoke College Archives; US Census 1900, 1910, 1920, 1930 NY; SSDI.

Last modified: December 15, 2008.

ANDERTON, Ethel L. September 23, 1888–February 19, 1971.
Wellesley College (BA 1911), Yale University (MA 1922, PhD 1925).

Ethel Louise Anderton was born in Dover, New Hampshire, the daughter of Isabelle (Richardson) (1853–1937) of New Hampshire and Washington Anderton (1854–1938) of England. Her father immigrated to the United States and went to Dover as a fabric colorist to work in the Cocheco Manufacturing Company. Neither parent attended college, and they married in about 1880. Washington Anderton was superintendent of the print works from 1880 until his retirement in 1896, after which he was in real estate. For at least a dozen years in the early decades of the century, Isabelle Anderton was proprietor of a stationery and variety store in Dover. Their first son, James, was born in 1882 and died as an infant. The surviving children were Katherine Davis (b. 1885), Ethel, and Thomas R. (1895–1982). Katherine worked for the telephone company, and Thomas was an electrical engineer with Westinghouse.

Ethel Anderton graduated from Wellesley College in 1911, after which she taught in high schools until 1924. She was teaching in Westfield, Massachusetts, in at least 1916 and 1917. The next year she began teaching in West Haven, Connecticut, and likely continued there until 1924. Also, starting in 1918, she attended Yale University part time and earned her master's degree in 1922 and her doctorate in 1925. She received university scholarships part of the time she was at Yale and was elected to Sigma Xi.

Anderton became an instructor at Wellesley College in 1924 and remained for three years, after which she taught one year, 1927–28, at Smith College. While at Smith she was promoted to assistant professor and continued in that rank when she moved to Mount Holyoke College, where she remained for another three years. Her last college teaching job was in 1931–32, when she replaced a faculty member on leave at Goucher College.

In 1933, at age forty-five, she rejoined the faculty at the high school in West Haven, Connecticut, as teacher and head of the mathematics department. While in West Haven, she engaged in work on tests and measurements for the West Haven school system and was active in various educational organizations. She was president of the West Haven Education Association and the West Haven Teachers' Credit Union, and was a member of the Committee on Teacher Welfare of the National Education Association. After her retirement in 1954, she engaged in a tutoring business in college and high school mathematics. In her late seventies, she was still tutoring an average of three hours a day and went back to teach in high school for four weeks as an emergency substitute.

In 1941 Anderton had a house built for herself in West Haven and was joined there by Elsie Schenker, a teacher friend, and, a few years later, by Schenker's sister, both of whom lived with her for most of the rest of her life. Anderton's non-professional interests and activities included riding, gardening, and conservation; she was a member of the League of Women Voters, the Connecticut Forest and Park Association, and was president of a local literary club.

Ethel Anderton died in New Haven, Connecticut, at age eighty-two in 1971. She was survived by her brother, Thomas R. Anderton, of York Beach, Maine.

Organizational affiliations: AMS, MAA, Sigma Xi.

Dissertation:
1925 Bioche curve pairs. PhD dissertation, Yale University, directed by James Kelsey Whittemore.

References to: AmMSc 4–8, 9P–10P.
Obituary. *New Haven Register*, 21 Feb 1971.

Other sources: Dover (NH) Public Library; communication with Robert E. Marston, local researcher, Dover, NH; Wellesley College Alumnae Office; Yale University Manuscripts and Archives; US Census 1880, 1900, 1910, 1920, 1930 NH, 1930 MA; SSDI.

Last modified: October 25, 2008.

ANDREWS, Annie Dale (Biddle). December 13, 1885–April 14, 1940.
University of California (BA 1908, PhD 1911).

Annie Dale Biddle was born in Hanford, California, the youngest of seven surviving children of Achsah A. (McQuiddy) (b. 1848) and Samuel Edward Biddle (1845–1908). Her parents were both from Tennessee, married there in 1870, and went to California and settled in Tulare County in 1874. Her father was a grain dealer, later bank president and manager, and active in public service in Hanford. The surviving children were three sons and four daughters: Tolbert Vance (1871–1954), Eliza Jane (b. 1874), Samuel Edward Jr. (1876–1946), Reta H. (1879–1972), Wallace Jefferson (1882–1961), Kate Justina (1884–1984), and Annie Dale.

Biddle attended the University of California in Berkeley where she was a member of Delta Gamma social sorority. After receiving her bachelor's degree in 1908, she was a University fellow in mathematics there in the academic years 1909–10 and 1910–11. As a student of pure mathematics she took courses in Synthetic Projective Geometry, the area of her research, with D. N. Lehmer; Theory of Functions (of a real variable, of a complex variable, and elliptic); Theory of Equations; Logic of Mathematics; Theory of Substitutions and Groups of Polyhedra; Theory of Invariants; Differential Geometry; and the Theory of Numbers. Her minor subject was English literature, and a faculty member from that area served on the committee for her final examination for the PhD. Biddle's 1911 doctorate was the third granted by the California mathematics department, the first to a woman.

The year after completing her work for the PhD, Biddle served as instructor of mathematics at the University of Washington in Seattle. She then returned to the Berkeley area and married, on October 7, 1912, William Samuel Andrews (1883–1952), a native of California and an attorney who had received his LLB degree from the University of California in 1906. A daughter, Wilhelmina Dale, was born on September 4 the following year, and a son, William Samuel Jr., was born six years later on July 20, 1919.

Annie D. B. Andrews continued her association with the University of California mathematics department after her marriage and taught while holding titles of teaching fellow 1914–16, assistant in mathematics 1916–17, associate in mathematics 1920–23, and instructor 1924–33. In 1933 Andrews was one of six junior faculty notified that they would not be reappointed because the department had decided to concentrate more on its graduate program. As this was during the Great Depression, the department considered whether the loss of the position would produce a significant hardship. Andrews, who was married to a practicing attorney, was the only one of the six who lost her job as of July 1, 1933. While she was on the faculty, Andrews was involved with the Women's Faculty Club, Torch and Shield, and Town and Gown. Her husband noted soon after her death that "during the last few years of her life in addition to running her home and doing mathematical research she took an active interest in public affairs and charitable work" (Owens questionnaire 1940).

After an illness of two years, Annie Andrews died in Oakland, California, in 1940 at fifty-four. Her body was cremated.

Organizational affiliations: AMS, Phi Beta Kappa, Sigma Xi.

Dissertation:
1911 [Biddle, A. D.] Constructive theory of the unicursal plane quartic by synthetic methods. PhD dissertation, University of California, Berkeley, directed by Derrick Norman Lehmer. Printed version, 1912, reprinted from *Univ. California Publ. Math.* 1:27–54.

Publication:
1912 [Biddle, A. D.] Constructive theory of the unicursal plane quartic by synthetic methods. *Univ. California Publ. Math.* 1:27–54. Published version of PhD dissertation. Review: *Rev. semestr. publ. math.* 34, pt. 1: 52 (D. J. Struik).

Abstract not listed above:
1933 The space quartic of the second kind by synthetic methods. *Bull. Amer. Math. Soc.* 39:205–06 #104. Presented to the AMS, Palo Alto, CA, 18 Mar 1933.

References to: AmMSc 4–7, BioWMath.

Other sources: Owens questionnaire 1940 (prepared posthumously by her husband); Bancroft Library, University of California, Berkeley; Eugene L. Menefee and Fred A. Dodge, *History of Tulare and Kings Counties California* (Los Angeles: Historic Record Company, 1913); Moore, *Mathematics at Berkeley*; US Census 1880, 1900, 1910, 1920, 1930 CA.

Last modified: October 31, 2008.

ANDREWS, Grace. May 30, 1869–July 27, 1951.
Wellesley College (BS 1890), Columbia University (MA 1899, PhD 1901).

Grace Andrews was born in Brooklyn, New York, one of five children (four daughters and a son) of Susan Matthews (Hotchkiss) (b. ca. 1827–1915), of Connecticut, and Edward Gayer Andrews (1825–1907), born in New York State. Her father had studied at Cazenovia Seminary, graduated from Wesleyan University in 1847, and was serving as pastor of a church in Cooperstown at the time of her parents' marriage in 1851. Later he was briefly president of Mansfield Female College in Ohio, was principal of Cazenovia Seminary, and in 1872 became a bishop of the Methodist Episcopal Church. The three surviving siblings of Grace were Winifred (b. ca. 1856), born in Ohio, and Helen (b. ca. 1859) and Edward (b. ca. 1863), both born in New York. From 1872 to 1880 the family was living in Des Moines, Iowa, and from 1880 to 1888 they were in Washington, D.C. In connection with her father's extended trip to India, Grace, her brother, and her mother spent about six months in Europe in 1877.

Grace Andrews was educated at the Mount Vernon Seminary (later a college for women and now a women's campus of George Washington University) in Washington, D.C., before going to Wellesley College. She entered Wellesley in 1885 as a member of the class of 1889 and, having taken the five-year course with music, graduated in 1890. While at Wellesley she was a member of Zeta Alpha, a literary and theatrical society on campus. She began graduate work at Columbia University in October 1897 and earned a master's degree in 1899 and a PhD in 1901. No advisor is indicated in the records. From 1900 to 1902 Andrews served as an assistant in mathematics at Barnard College. She reported to Wellesley that during the first year she was teaching two classes, one freshman level and one elective, and had light duties the second year. She was living in Manhattan when she joined the AMS in December 1901 and remained at the same address through at least 1903, after which she moved to her family's home in Brooklyn. She continued to live with her mother after her father's death in 1907 and remained in the family home until her mother's death in 1915.

From 1905 to 1926 Grace Andrews was an accountant to the treasurer at Wesleyan University, work she was able to do while living in Brooklyn. She noted in 1909 that she was going to be taking a course in accounting. From 1916 until her death she had responsible positions with the New York branch of the Women's Foreign Missionary Society of the Methodist Episcopal Church, serving at various times as home base secretary, receiving treasurer, treasurer, chairman of the finance committee, and director.

Although she was not employed as a mathematician after 1902, Grace Andrews attended about two AMS meetings a year in New York City through 1907 and remained a member of the society until about 1918. Andrews was a member of the Brooklyn Botanic Garden; the New York Wellesley Club; the Kosmos Club of Brooklyn, where she was treasurer and director; and the Women's University Club of New York. She liked to travel and spent about a month every summer out of the city, frequently in the nearby mountains. She was an avid reader and fond of doing double crostic puzzles. Although she lived alone after the death of her mother, she had many nieces and nephews in the vicinity and was involved with her extended family.

Grace Andrews died at eighty-two in 1951 in Margaretville, New York, near where she had frequently visited in the summers. The funeral and burial were in Syracuse, New York. Andrews made a bequest of $500 to Wellesley College in honor of the class of 1889.

Organizational affiliations: AMS, Phi Beta Kappa.

Thesis and dissertation:
1899 Isothermal systems of plane curves. MA thesis, Columbia University.
1901 The primitive double minimal surface of the seventh class and its conjugate. PhD dissertation, Columbia University. Printed by Evening Post Job Printing House, NY.

References to: AmMSc 1–4; AmWomSc; BiDWSci; WhoEast 1930; WomScSearch; WomWWA.

Other sources: Owens questionnaire 1937; Columbia University Archives; communication with Wellesley College Archives; NatCAB 12 (Andrews, Edward Gayer); Francis J. McConnell, *Edward Gayer Andrews: A Bishop of the Methodist Episcopal Church* (New York: Eaton and Mains, 1909); US Census 1860, 1870 NY, 1880 IA, 1910, 1920, 1930 NY.

Last modified: July 19, 2009.

ARMSTRONG, Beulah. November 18, 1895–February 22, 1965.
Baker University (BA 1917), University of Kansas (MA 1918), University of Illinois (PhD 1921).

Beulah May Armstrong was born in Sterling, Kansas, the only daughter and the third of five children of Lillie J. (Detter), born in 1872, and John Allen Armstrong, born in 1867, both natives of Pennsylvania. Her parents married in about 1888. Her brothers were all born in Kansas: Guy W. in 1889, Russell B. in 1894, John A. in 1897, and William Keith in about 1905. In 1900 the family was living in Enterprise Township, Kansas, where her father was a farmer; in 1910 they were in Hutchinson, Kansas, and her father owned or managed a hardware store. The family remained in Hutchinson, and no occupation was listed for her father in later census reports.

Armstrong graduated from Hutchinson High School before entering Baker University, a coeducational school affiliated with the Methodist Church, in Baldwin City in eastern Kansas. While at Baker she became a member of the social sorority Zeta Tau Alpha. After her graduation from Baker University in 1917, Armstrong held a scholarship for a year at the nearby University of Kansas. She received her master's degree in 1918 and was awarded a fellowship at Kansas for the following year but resigned it, apparently to continue her graduate work at the University of Illinois with a scholarship in 1918–19 and a fellowship in 1919–21. She received her PhD in 1921 from Illinois with a dissertation in group theory.

Armstrong remained at Illinois as instructor 1921–31, associate 1931–45, assistant professor 1945–59, and associate professor from 1959 until her retirement in 1963 as associate professor emeritus. A former colleague, P. W. Ketchum, recalled that, "as a teacher she was tops." She was heavily involved with advising students who were planning to become mathematics teachers and taught many of the courses they were to take. She also was an instructor in the University of Illinois correspondence course program.

Armstrong was active in a number of organizations on and off campus. She was a charter member of the University of Illinois chapter of Sigma Delta Epsilon, graduate fraternity for women in science; she remained active at the local level and was honored for her contributions at the time of her retirement. She also served as national treasurer in 1946 and 1947. She served as secretary and treasurer of the Illinois chapter of Sigma Xi and was a member of Kappa Delta Pi, an education honor society. While at the University of Illinois, she continued her interest in her college social sorority, Zeta Tau Alpha, and was honored by them in 1964 for her service to the Illinois chapter and the Champaign-Urbana alumnae association. She had held advisory and corporate board positions for the chapter and offices in the alumnae association. After her death a memorial study in the chapter house at Illinois was established in her name.

Armstrong was described by P. W. Ketchum as athletic, and he related that she and his wife, Gertrude Stith Ketchum, played volleyball. In 1937 Beulah Armstrong indicated that she was especially interested in reading, philanthropy, and traveling. For her entry in *Who's Who of American Women* in the late 1950s, she identified as a Republican and a Methodist. She was a member of Wesley Methodist Church in Urbana, was active in the work of the Wesley Foundation, and in 1923 served as national president of Kappa Phi, a non-denominational group for Christian university women.

Shortly after her retirement, Armstrong indicated that she was expecting to move to a retirement community in Boulder, Colorado, in about a year and a half. However, she died suddenly of a coronary occlusion at age sixty-nine at her home in Urbana, Illinois, in 1965. She was survived by three brothers, Guy W. Armstrong, R. B. Armstrong, and W. Keith Armstrong. She was buried in Fairlawn Cemetery, Hutchinson, Kansas. Her estate included a bequest of $1,000 to Baker University.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1918 Simple and complete K-points in a modular projective plane. MA thesis, University of Kansas.
1921 Mathematical induction in group theory. PhD dissertation, University of Illinois, directed by George Abram Miller.

References to: AmMSc 4–8, 9P–11P, WhoAmW 1.
"Dr. Beulah Armstrong Is Honored by Sigma Delta Epsilon Fraternity." *Champaign-Urbana News-Gazette*, 23 May 1963.
"Prof. Armstrong Dies." *Champaign-Urbana Courier*, 23 Feb 1965.
"Armstrong Rites Are Thursday." *Champaign-Urbana Courier*, 24 Feb 1965.
"Beulah Armstrong." (Obituary) *Hutchinson* (*KS*) *News*, n.d.

Other sources: Owens questionnaire 1937; P. W. Ketchum, conversation with author and Uta C. Merzbach, 23 Mar 1983, Urbana, IL; communication with Baker University Alumni Relations; US Census 1900, 1910, 1920 KS, 1930 IL; Illinois death certificate.

Last modified: October 24, 2008.

ARNOLDY, Sister Mary Nicholas. March 7, 1893–September 28, 1985.
Kansas State Agricultural College (BS 1929), Catholic University of America (MA 1930, PhD 1933).

Catherine Helen Arnoldy, born in Tipton, Kansas, was the eighth of nine children of Anna (Holz) (1855–1944) and Nicholas Arnoldy (1845–1920). Her mother was born in Iowa; her father, born in Germany, had emigrated with his family and settled in Iowa when he was nine. Both attended school through the eighth grade. They married in Iowa and in 1879 moved to Tipton, Kansas, where her father was a storekeeper. The first child of the marriage, Catherine, died as an infant in 1877. Her other siblings were John Peter (1878–1959), Elizabeth (1881–1911), Edward Conrad (1884–1886), George Matthew (1886–1979), Charles John (1888–1909), Mary E. (1891–1976), and Leo Matthew (1896–1976).

Catherine Arnoldy attended parochial school in Tipton and did her high school work at the Nazareth Academy in Concordia, Kansas, before entering the Nazareth Convent in 1910 and making her profession of vows in 1912. All three surviving daughters became Sisters of St. Joseph. The eldest daughter, Sister Modesta, died at twenty-nine; Sister Domitilla became a biologist and taught at Marymount College in Salina, Kansas, where Sister Mary Nicholas was to spend most of her career.

In the seventeen years before she entered the Catholic University of America for graduate work, Sister Mary Nicholas had various teaching assignments in Kansas; these included schools in Schoenchen, Emmeram, Antonino, and Manhattan. In this same period she was doing her undergraduate work. From 1921 to 1923 she attended the Fort Hays Kansas State Normal School (now Fort Hays State University), and in 1923–24 she was among the first women to attend teachers' courses at Creighton University, a Jesuit institution in Omaha, Nebraska. She received her bachelor's degree from Kansas State Agricultural College (now Kansas State University) in 1929 after studying there during the first semesters of 1924–25 and 1928–29 and summer sessions every summer from 1924 until 1929, except for the summer of 1928 when she studied at Creighton. She also took one course in music from Manhattanville College of the Sacred Heart, Pius X School of Liturgical Music, New York, in each of the winters of 1923, 1924, 1925.

Sister Mary Nicholas entered Catholic University in 1929, received her master's degree in 1930, and completed her doctoral work in September 1932 with minors in physics and education. She then taught for the next thirty-four years at Marymount College in Salina, Kansas. Founded in 1922 by the Congregation of the Sisters of St. Joseph, Marymount was the first four-year liberal arts college for women in Kansas. She was director of the mathematics department and, for several years, was the only mathematics instructor; at various times she was also the college registrar.

After her retirement from Marymount College in 1966, two years before it became coeducational, Sister Mary Nicholas taught at Sacred Heart High School in Salina; Notre Dame High School in Concordia; and then worked part time at Central Catholic High School in Grand Island, Nebraska. She was known for her hard work, for her love of gardening, and for her mastery of tatting. She was taciturn and had a very dry sense of humor.

At age eighty Sister Mary Nicholas retired to Medaille Center in Salina. At ninety she moved back to the Nazareth Motherhouse in Concordia, where she died

two years later, in 1985. She had been a member of the Sisters of St. Joseph in Concordia for seventy-five years and was buried in the sisters' cemetery there.

Thesis and dissertation:
1930 The curves used in the duplication of the cube. MA thesis, Catholic University of America. Typescript.
1932 The reality of the double tangents of the rational symmetric quartic curve. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC. PhD granted 1933. Review: *JFM* 58.0701.01 (E. Schönhardt). See also **1934**.

Abstracts:
1934 Reality of the double tangent contact parameters of the rational symmetric quartic curve. *Amer. Math. Monthly* 41:407 #7. Presented to the MAA, Topeka, KS, 17 Mar 1934. Based on PhD dissertation.
1949 Requirements for a bachelors degree with a major in mathematics. *Amer. Math. Monthly* 56:711 #6. Presented to the MAA, Manhattan, KS, 2 Apr 1949.
1954 A survey of the certification requirements in mathematics for elementary and high school teachers. *Amer. Math. Monthly* 61:291 #4. Presented to the MAA, Topeka, KS, 11 Apr 1953.
1955 Magic circles. *Amer. Math. Monthly* 62:696 #3. Presented to the MAA, Hays, KS, 26 Mar 1955.

Reference to:
"Nun Math Professor Dies." *Register*, 11 Oct 1985.

Other sources: Owens questionnaire 1937; Religious Women in Mathematics Survey 1983; Smithsonian questionnaire 1985; communication with Sisters of St. Joseph, Concordia, KS; US Census 1900, 1910, 1920 KS; SSDI.

Last modified: July 19, 2009.

BABCOCK, Wealthy. November 18, 1895–April 10, 1990.
University of Kansas (BA 1919, MA 1922, PhD 1926).

Wealthy Consuelo Babcock was born on a farm in Washington County, Kansas, near the Nebraska border. She was the second child of Ella (Kerr) (b. 1872), a Kansas native, and Cassius Lincoln Babcock (b. 1859), originally from Indiana. Their son, Dale, was born in 1891, four years before Wealthy. In 1900 Cassius Babcock was a farmer; in 1910 the family was living in Hiawatha, in the northeast corner of Kansas, and he was a carpenter. In 1920 Wealthy and her parents were living in Steele City, Nebraska, just across the border from Washington County, Kansas.

Wealthy Babcock graduated in 1913 from Washington County High School and taught for one year at Liberty School followed by a year at Lone Mound, both one-room country schools in Washington County. She then attended the University of Kansas where she was a member of the women's basketball team, an early indication of her interest in sports. After receiving her BA in 1919, she taught for a year at Neodesha High School in southeastern Kansas.

Babcock then returned to the University of Kansas, where she was to spend the rest of her career. She was an instructor starting in 1920, while also earning her graduate degrees: a master's in 1922 and a doctorate with a minor in physics in 1926. She was promoted to assistant professor in 1926 and to associate professor in 1940; she retired at that rank in 1966. During her tenure on the Kansas faculty Babcock regularly attended meetings of the Kansas Section of the MAA.

According to G. Baley Price's 1975 history of the University of Kansas mathematics department, she was known as an outstanding teacher. She was the department's librarian for more than thirty years, and this contribution was acknowledged in 1966 by the naming of the Wealthy Babcock Mathematics Library. She served on many committees on scholarships and awards and was particularly active in the KU Alumni Association's activities, for which she received the Fred Ellsworth Medallion, the highest award for service, in 1977. This honor was noted again in October 2002 in the article "Old Home Town – 25, 40 and 100 Years Ago Today" in the *Lawrence Journal-World*. Scholarships that have been given in her name include the Black–Babcock mathematics scholarship, the Wealthy Babcock scholarship, the Charles H. Ashton–Wealthy Babcock scholarship, and the Wealthy Babcock New Student scholarship. A floor of Templin Hall, a residence hall at the university, is named the Wealthy Babcock House.

Babcock's career paralleled in many ways that of Florence Black, a close friend and colleague at the University of Kansas, with whom she shared many interests. Black, too, received a PhD from Kansas in 1926 and was on the mathematics faculty for her entire career. They were both avid sports fans, faithfully attending university football and basketball games. In 2005 a columnist for the *Lawrence Journal-World* noted that "I go back to the days when the likes of Florence Black, Wealthy Babcock and Elizabeth Lawson knew as much about KU hoops as any living creatures. They were fixtures in Hoch Auditorium and the fieldhouse for eons." Both Babcock and Black were interested in camping and the out-of-doors. Price notes that Babcock owned a stable of horses that she and Black rode. Both were elected to the University of Kansas Women's Hall of Fame in 1973. The College

of Liberal Arts and Sciences reported in 2005 that the Florence Black and Wealthy Babcock Professorship in Mathematics was newly established.

Wealthy Babcock died at ninety-four at Presbyterian Manor in Lawrence, Kansas, in 1990. Survivors included a nephew, great-nephews and great-nieces, and great-great-nephews and great-great-nieces. She was cremated with inurnment in the Pioneer Cemetery on the campus of the university.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1922 On coaxial minors of determinants. MA thesis, University of Kansas.
1926 On the geometry associated with certain determinants with linear elements. PhD dissertation, University of Kansas, directed by Ellis Bagley Stouffer. Printed version, 1929, reprinted from *Univ. Kansas Sci. Bull.* 19 (3): 27–42.

Publication:
1929 On the geometry associated with certain determinants with linear elements. *Univ. Kansas Sci. Bull.* 19 (3): 27–42. Published version of PhD dissertation. Presented to the AMS, Lawrence, KS, 1 Dec 1928; abstract: *Bull. Amer. Math. Soc.* 35:146–47 #7.

Abstracts not listed above:
1923 A new method of determining sufficient conditions for real roots of equations. *Amer. Math. Monthly* 30:106 #6. Presented to the MAA, Topeka, KS, 20 Jan 1923.
1927 Some important points in the development of the theory of determinants. *Amer. Math. Monthly* 34:400 #4. Presented to the MAA, Topeka, KS, 5 Feb 1927.

Presentation not listed above:
Mathematics in War. Presented to the MAA, Lawrence, KS, 10 Apr 1943.

References to:
"Wealthy C. Babcock." (Obituary) *Lawrence Journal-World*, 11 Apr 1990.
Mayer, Bill. "Mayer: Rabid KU Fans Prove Basketball's Mass Appeal." *Lawrence Journal-World*, 23 Jan 2005.

Other sources: Price, *History of the Department of Mathematics of the University of Kansas*; US Census 1900, 1910 KS, 1920 NE; SSDI.

Last modified: December 16, 2008.

BACON, Clara L. August 13, 1866–April 14, 1948.
Hedding College (PhB 1886), Wellesley College (BA 1890), University of Chicago (MA 1904), Johns Hopkins University (PhD 1911).

Clara Latimer Bacon was born in Hillsgrove, Illinois, the daughter of Louisa (Latimer) (1831–1914) of Abingdon, Illinois, and Larkin Crouch Bacon (1818–1877), originally from Tennessee. Her father was a farmer and dealt in stock. Her parents married, each for a second time, in 1864. Clara was the eldest of four children of this marriage; her siblings were a sister, Nannie (1867–1880); a brother, Willie Larkin (ca. 1871–1880); and a sister, Agnes Latimer (1874–1930).

Clara Bacon attended primary school at the Hillsgrove county school and secondary school at the North Abingdon High School. After receiving her PhB in 1886 from Hedding College in Abingdon, Bacon taught for the year 1886–87 at a private school in Dover, Kansas. She enrolled at Wellesley College in 1887 and received her second bachelor's degree in 1890. When she later received her PhD, the Wellesley instructor whom she singled out for thanks was Ellen Hayes, who had gone to Wellesley in 1879 shortly after she received a bachelor's degree from Oberlin College.

After graduating from Wellesley, Bacon taught for seven years (1890–97) at four different schools. The first year she taught in a private school in Litchfield, Kentucky, and the next two years she taught mathematics and German and served as librarian at Hedding College. During 1893–95 she was principal of North Abingdon High School, and finally, during 1895–97 she was preceptress and teacher of mathematics at Grand Prairie Seminary, a secondary school in Onarga in eastern Illinois.

In 1897 Bacon was hired as an instructor at Woman's College of Baltimore (Goucher College after 1910), beginning a career there that was to last until 1934. In 1897 the only other mathematician on the faculty was William H. Maltbie, who in 1891 had used the president of Hedding College as a reference for admission to the Johns Hopkins University and who had earned his doctorate from Johns Hopkins in 1895. At the time that Bacon went to Maryland, her sister Agnes had just earned a bachelor's degree in physics at Wellesley, and they both moved to Baltimore with their mother.

During the summers of 1901 to 1904, Bacon studied at the University of Chicago. She completed her thesis in 1903, received her master's degree in September 1904, and was promoted to associate professor at Woman's College the following year. She also studied at Chicago during the summers of 1907 and 1908.

In 1907 the trustees of Johns Hopkins voted to allow women to be admitted to graduate courses without the special permission that had been needed by Christine Ladd (Ladd-Franklin) in 1878 and Charlotte Barnum in 1890. The resolution adopted did permit individual instructors to object to women in their classes, however. In September 1907, Bacon applied to Johns Hopkins to study mathematics; in October 1910, she applied for candidacy for the PhD degree in mathematics with subordinate subjects education and philosophy. One of the courses she used to fulfill the philosophy requirement was a 1908–09 course in symbolic logic with Christine Ladd-Franklin.

During 1909–11 Bacon was a fellow by courtesy at Johns Hopkins, and during the second of these two years she held a fellowship from the Baltimore Association for the Promotion of the University Education of Women, an organization that

Ladd-Franklin had helped to organize in 1897. During this period Bacon's sister Agnes was a physics student at Johns Hopkins, and in 1914 she was a mathematics student at the University of Chicago. Agnes Bacon worked at the Johns Hopkins School of Hygiene and Public Health and published several articles in the field of biometrics during the early 1920s.

Clara Bacon received her PhD from Johns Hopkins in 1911, the first year Johns Hopkins granted PhD's to women without special approval of the trustees. She was one of four women to receive a PhD from Johns Hopkins that year, the only one of the four in mathematics. She was, however, the second woman to *earn* a PhD in mathematics from Johns Hopkins; Ladd-Franklin, the first in 1882, was not awarded the degree until 1926.

Bacon was one of the first two women to study mathematics at Johns Hopkins under its new policy. The other was Florence P. Lewis, who was enrolled full time during 1907–08, joined the mathematics faculty at the Woman's College of Baltimore in 1908, completed her work for the PhD at Johns Hopkins in 1913, and also spent the rest of her career at Goucher College.

In 1913 Bacon published her dissertation in the *American Journal of Mathematics* and the following year was promoted to professor. She remained in that rank until she retired in 1934 as professor emeritus. Her only other teaching position was during the summer of 1922 at Hunter College. During her years at Goucher, students, faculty colleagues, and administrators all valued her teaching, organization, and general humanity. After her death a colleague wrote: "Few people have given a more constant and loyal devotion to Goucher College. To the amazement of her colleagues, Miss Bacon never lost her keen zest in the whole round of college activities, from Matriculation Vespers all the way to Commencement Exercises. The secret of this unflagging delight lay, I believe, in her real interest in every one of her students, and in her warm friendly feelings toward her colleagues" (Lewis 1948, 20).

While Bacon was on the Goucher mathematics faculty, ten women graduated who later received PhD's in mathematics. Of these ten, seven received their doctorates from the Johns Hopkins University. At the time of Bacon's retirement, Marguerite Lehr, who had graduated from Goucher in 1919, wrote that "for those students who majored in mathematics [Bacon's] relation with the Johns Hopkins University was of great importance. Advanced work sometimes took particular form because of a senior's plan to continue her work there" (1934, 3). Bacon not only encouraged women to go to graduate school but assisted many financially so that they could do so. After her death, an administrator wrote that "in committees Dr. Bacon fought for the individual who was not brilliant but who was potentially a good and useful citizen, and her judgment was usually sound. It was understood that a student who was good, but not quite good enough to receive a scholarship, might receive financial help from her. We felt it wise to be on guard against letting her hear of too many such cases" (Lewis 1948, 20). Bacon was also generous to Goucher; two years before her retirement she provided the institution with funds so that the department could purchase a Monroe calculating machine.

Bacon was active in many organizations. She was a charter member of the MAA and stood for election to the board of trustees in 1922 and for vice president in 1924 and 1929. Although she was never elected to a national office in the MAA, she was a member of the executive committee (1919) and then chairman (1931–32) of the

Maryland-District of Columbia-Virginia Section. She was president of the Baltimore chapter of the AAUP and of the College Club (the Baltimore branch of AAUW), and served for many years on the College Entrance Examination Board. She was also a member of the Equal Suffrage League of Baltimore, the Foreign Policy Association, the League of Women Voters, and the Daughters of the American Revolution. In 1937 she reported that she was a member of the Methodist Episcopal Church and "several associations for peace" (Owens questionnaire). Bacon was an avid traveler, who had traveled with her sister, Agnes, before Agnes's death in 1930. After Bacon's retirement she fulfilled a promise to Agnes to travel again, and she visited England, Italy, Egypt, and Palestine during a fifteen-month trip abroad.

After an illness of a year, Clara Bacon died in the Baltimore home she had shared with her mother and sister until their deaths. She had been an active church member, and her funeral service was held in the First Methodist Church, which was near the house on Calvert Street in which she had lived for fifty years. She is buried in Cherry Grove Cemetery near Abingdon, Illinois. The Clara and Agnes scholarship is an endowed scholarship at Goucher, and one of the residential houses at Goucher is named in honor of Clara Bacon.

Organizational affiliations: AMS, MAA (charter member), AAAS, AAUP, AAUW, Phi Beta Kappa.

Thesis and dissertation:

1903 The determination and investigation of the real chords of two conics which intersect in fewer than four real points. MA thesis, University of Chicago. Typescript. MA granted 1904.

1911 The Cartesian oval and the elliptic functions ρ and σ. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Printed version, 1913, reprinted from *Amer. J. Math.* 35:261–280.

Publication:

1913 The Cartesian oval and the elliptic functions p and σ. *Amer. J. Math.* 35:261–280. Published version of PhD dissertation. Reviews: *JFM* 44.0527.02 (A. Baruch); *Rev. semestr. publ. math.* 22, pt. 1: 1 (E. B. Cowley).

References to: AmMSc 3–7; BiDWSci; BioWMath; WhAm 2.

Lehr, Marguerite. "Clara Latimer Bacon." *Goucher Alumnae Quarterly*, July 1934: 3–4.

"Dr. C. L. Bacon Dies at Age 81." *Baltimore Morning Sun*, 15 Apr 1948.

Lewis, Florence P. "Clara Latimer Bacon: Aug. 23, [*sic*] 1866–April 14, 1948." *Goucher Alumnae Quarterly*, Spring 1948: 19–22.

Other sources: MA thesis biographical notes 1903; PhD dissertation biographical note 1911; Owens questionnaires 1937, 1940; Johns Hopkins University Archives; University of Chicago, Office of the University Registrar; Cockey, "Mathematics at Goucher"; US Census 1860, 1870, 1880 IL, 1900, 1910, 1920, 1930 MD.

Last modified: September 23, 2015.

BAKER, Frances E. December 19, 1902–April 4, 1995.
University of Iowa (BA 1923, MS 1925), University of Chicago (PhD 1934).

Frances Ellen Baker was born in Anna, Illinois, the elder of two daughters of Katherine (Riedelbauch) (1868–1952) and Richard Philip Baker (1866–1937). Frances Baker's mother was born in Glasford, near Peoria, Illinois, and attended the Peoria county schools. She studied music privately and, except when she was attending college, was a private teacher of piano and voice as well as a choir director at intervals from 1890 to 1898. She earned a diploma in music from the School of Music at Illinois Wesleyan University in 1897 and was instructor of piano and music and head of the music department at Lamar College (now closed) in Lamar, Missouri, from 1898 to 1901.

Baker's father, born in Shropshire, England, received his undergraduate education at Oxford University and at the University of London, from which he received a bachelor's degree in 1887. In 1888 he moved to Texas and taught music and in a secondary school while he studied law. In early 1891 he was admitted to the Texas bar and practiced law there until 1894. He then studied mathematics at the University of Chicago 1894–96, except for the fall term of 1895 when he taught in the music department of the University of Oregon. During his first year at Chicago he also read entrance examination papers in Latin and Greek and was organist and director of a choir. According to Frances Baker, he was awarded a fellowship in mathematics at Chicago for 1896–97 but did not accept because the "stipend [was] insufficient to live on." Instead, he taught mathematics, chemistry, and physics at the Kenosha Boys' School in Wisconsin. From 1897 to 1901, R. P. Baker was president, and head of science and mathematics, of Lamar College, where presumably he met his future wife.

In 1901 Baker's father became co-principal and head of science and mathematics at Union Academy, a private secondary school in Anna, in southwestern Illinois. On February 22, 1902, Katherine Riedelbauch and Richard Philip Baker were married in Glasford, Illinois. The Bakers made their first trip to England in the summer of 1903 to introduce their new daughter, Frances, born in December 1902, to her English grandparents. R. P. Baker remained at Union Academy until 1904; during 1903–04 Katherine Baker taught elementary German there. The Bakers spent the next year in Chicago, where R. P. Baker was head chemist at R. R. Donnelly, a printing company. For many years R. P. Baker had constructed mathematical models, which he considered essential for teaching geometry. In January 1905 he had printed a catalog of a hundred models he had made and was selling. Many of his models are currently in the mathematical collections of the National Museum of American History, Smithsonian Institution, and of the University of Arizona. Some of Baker's models were displayed in the section Geometric Models – Richard P. Baker of a 2015 exhibit of Mathematical Objects Relating to Charter Members of the MAA.

In the fall of 1905 R. P. Baker began a thirty-two year association with the mathematics department of the State University of Iowa (commonly referred to as the University of Iowa). He was instructor from 1905 to 1910, when he earned his PhD in mathematics from the University of Chicago with a dissertation directed by E. H. Moore. Baker was assistant professor 1910–15 and then associate professor until his death in 1937. Katherine Baker continued to give private lessons in piano and voice

from 1906 until 1926. The Bakers established and played with the first chamber music ensemble in Iowa City. The Bakers' other daughter, Gladys Elizabeth, was born in Iowa City in July 1908.

Frances Baker received her elementary education from her parents. She wrote in 1985, "My father gave me significant mathematical instruction and guidance from age 10 onward. Before that age I owe [my] earliest mathematical training to my mother, especially in arithmetic and music" (Smithsonian questionnaire). Her mother also taught her German, and Gladys Baker reported later that "Frances was already an accomplished pianist when she entered high school in 1915" and that "her German was good enough so that later in the University she could enroll in a third year class" (Gladys Baker, Biographical Notes). She attended public high school in Iowa City, was active with the school newspaper and yearbook, and graduated as valedictorian of her class in 1919.

Frances Baker did her undergraduate studies and two years of graduate work at the University of Iowa. She entered the university in 1919, before her seventeenth birthday. After losing a semester's work early in 1920 because of the Spanish influenza, she made up the credits in summer school and graduated magna cum laude in 1923, having been elected to Phi Beta Kappa her junior year. She studied Latin and Greek as well as mathematics and won both the Latin and Greek prizes her senior year. As an undergraduate Baker was active in the Classics Club, was a member of the Iowa women's debating team, and was elected to Delta Sigma Rho, an honorary debating society. Her sister, Gladys, wrote later that "it was difficult for her to decide on a major subject as she was an all-round scholar but finally settled on Mathematics because that was what she wished to teach" (Gladys Baker, Biographical Notes). Frances Baker wrote in 1985, "A strong motivating factor from my senior year, 1922–1923, was awareness of the historical development of Mathematics through such works as Cassius J. Keyser's book *Mathematical Philosophy*" (Smithsonian questionnaire). For the next two years, she worked for her master's degree, studying mainly under the direction of her father. During her last year she held a graduate fellowship and taught a freshman mathematics course for one semester, before receiving a master's degree in 1925 with work in mathematics and physics.

After earning her master's degree Baker spent most of the next six years teaching, with some graduate study in mathematics. She was an instructor of mathematics and physics and head of the department at Tabor College in Tabor, Iowa, 1925–27. While there she taught mathematics courses through calculus as well as year courses with laboratories in college physics and inorganic chemistry. Because of financial difficulties Tabor College closed in 1927, and Baker held a similar position at Jefferson City Junior College in Missouri 1927–28. During the summer of 1928, she and Gladys made a trip to Europe and included a visit with an aunt in England. After deciding she would not return to Jefferson City, Frances enrolled at the University of Iowa for one semester to earn a teaching certificate. She then attended the University of Chicago for two quarters in 1929, beginning in the spring quarter. From 1929 to 1931 she was instructor of mathematics and head of the department at the Creston, Iowa, Junior College and Senior High School.

Frances Baker returned to the University of Chicago in 1931, held a fellowship 1932–33, and taught a freshman course in the spring quarter of that year. She received her PhD in March 1934 with a dissertation directed by L. E. Dickson on the

Waring problem for cubic functions. Although she did not publish her dissertation, it was cited in several articles published in 1934.

The education of her younger sister, Gladys Elizabeth Baker, was similar, but in botany rather than mathematics. Gladys Baker also earned a bachelor's degree and a master's degree at the University of Iowa, in 1930 and 1932, respectively. She continued her graduate work in botany and mycology at Washington University in St. Louis and received her doctorate in 1935. She taught at Hunter College 1936–40 and at Vassar College 1940–63 and was chairman of the plant science department at Vassar 1948–60. She taught at the University of Hawaii at Manoa for most of the next decade until her retirement in 1973.

Frances Ellen Baker lived at home in Iowa City during the first semester 1934–35 and was an instructor at Vassar College during the spring semester 1934–35, while Louise D. Cummings was on leave. In the fall of 1935 she went to Mount Holyoke College, from where Emilie Martin had just retired after nearly thirty years on the faculty. Baker remained at Mount Holyoke for the next seven years as instructor 1935–40 and assistant professor 1935–42. She had a leave in the fall semester 1938, having been injured in an automobile accident, and was replaced for that semester by Mary Barbara Haberzetle (Turner), who had just received her doctorate from Chicago. While at Mount Holyoke Baker taught courses from analytic geometry through calculus, history of mathematics, modern geometry, probability and statistics, and theory of equations; and she directed three honors papers.

In 1942 Baker joined her sister, Gladys, at Vassar College and spent the rest of her career there. She was hired as associate professor, was promoted to professor in 1951, and retired as emeritus professor in 1968. She later mentioned as positive influences Henry S. White, a former president of the AMS who was at Vassar 1905–36, and Mary E. Wells who was on the faculty at Vassar from 1915 until her retirement in 1948. Wells had become department chair when White retired.

Baker directed several honors papers at Vassar in addition to teaching mathematics courses. She chaired the Vassar department 1948–50 and 1951–52. She had three research leaves while at Vassar. During the second and third terms of 1945–46 she was an honorary fellow at the University of Wisconsin; she spent the academic year 1952–53 at Princeton University; and she spent the year 1960–61 at the University of North Carolina. She also spent the summer of 1953 at the University of California at Berkeley.

In 1943 and 1944 Baker gave talks at Rutgers University and at McGill University on the mathematical models her father had constructed forty years earlier. She also gave talks on topics in the history of mathematics at Hollins College in 1947, at Hobart and William Smith Colleges in 1952, at the University Club in Sun City, Arizona, in 1978, and at a meeting of the Southwestern Section of the MAA at Northern Arizona University in 1980. Starting a few years before her retirement, she became a frequent book reviewer for the library journal *Choice* and reviewed twenty-five books, more than half in probability or statistics, from 1964 through 1974.

At Vassar, Baker was a member of the Science Club 1942–48 and the local chapters of Phi Beta Kappa and Sigma Xi. She served as treasurer, on the membership committee, and as president of the Vassar Phi Beta Kappa chapter. In 1957–58 and 1966–67 she was president of the Vassar Sigma Xi chapter. She was a member of the History of Science Society from 1940 until 1968 and was a member of the New

York Academy of Sciences from 1964 until the early 1970s. Baker was a member of the Protestant Episcopal church. She described her interests as reading, music, and travel.

In January 1974, Gladys Baker moved to Sun City, Arizona, just outside Phoenix, and Frances Baker moved to a separate home there that autumn. While there Frances read college mathematics books for Recordings for the Blind. As her health worsened in the mid-1980s, she moved into intermediate care facilities, and in November 1989 she moved to the Plaza del Rio Care Center in nearby Peoria, Arizona, where she lived until her death at age ninety-two in 1995. Services were held in Iowa. She was survived by her sister, Gladys, who died in Arizona in 2007, just after her ninety-ninth birthday.

Organizational affiliations: AMS, MAA, IMS, Hist. Sci. Soc., Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1925 Compound statements on four classes. MS thesis, University of Iowa, directed by Richard Philip Baker. See also **1928**.
1934 A contribution to the Waring problem for cubic functions. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition distributed by the University of Chicago Libraries. Review: *JFM* 60.0942.02 (H. Rothe-Ille).

Publications:
1928 Compound statements on four classes. *Amer. J. Math.* 50:195–208. Reviews: *JFM* 54.0143.02 (H. Prüfer); *Rev. semestr. publ. math.* 34, pt. 1: 3 (W. G. J. ten Pas).
1938 Comments on a paper by Dr. Doole. *Amer. Math. Monthly* 45:679–81. Reviews: *JFM* 64.0203.01 (L. Von Schrutka); *Zbl* 019.40304 (H. Geppert).
1954 Review of "Leibniz' Mathematische Studien in Paris" and *Die Entwicklungsgeschichte der Leibnizchen Mathematik ... in Paris (1672–1676)*, both by J. E. Hofmann. *Scripta Math.* 20:175–78. Submitted by invitation, March 1951.

Abstract:
1952 The Leibniz characteristic triangle. *Amer. Math. Monthly* 59:589–90 #7. Presented to the MAA, Geneva, NY, 10 May 1952.

Presentation not listed above:
On the construction of Heron parallelograms and triangles. Presented to a meeting of the MAA, Flagstaff, AZ, 25–26 Apr 1980.

References to: AmMSc 6–8, 9P–11P, WhoAmW 5–7.
"Frances Ellen Baker." (Obituary) *Arizona Republic*, 8 Apr 1995.
"Frances Ellen Baker." (Obituary) *Phoenix Gazette*, 8 Apr 1995.
"Frances Baker: Daughter of a Mathematical Model Maker." In *Women Mathematicians and NMAH Collections* (NMAH Object Group).

Other sources: PhD dissertation vita 1934; Owens questionnaire 1937; Smithsonian questionnaire 1985; Mount Holyoke College Archives; communications with Gladys E. Baker and with Barton County Historical Society, Lamar, MO; Gladys Baker, Biographical Notes for Frances Ellen Baker, 1902–1995 (typescript to author); R. P. Baker PhD dissertation vita 1910; Smithsonian questionnaire for R. P. Baker 1985 (completed by Frances E. Baker); US Census 1900 MO, 1910, 1920, 1930 IA.

Last modified: January 8, 2016.

BALLANTINE, Constance (Rummons). August 15, 1896–January 14, 1974. University of Nebraska (BA 1916, MA 1919), University of Chicago (PhD 1923).

Constance Juliet Rummons was born in Lincoln, Nebraska, the daughter of Clara (Schroeder) (1871–1964), born in Illinois, and Nestor Rummons (1869–1929), a native of Missouri. Her mother was a homemaker and legal secretary; her father was a lawyer, who had graduated from Central Wesleyan College in Missouri in 1887 and from the College of Law at the University of Michigan in 1890. A year or two after their 1895 marriage, the family moved from Lincoln to Elwood, Nebraska, and in 1901 to Hobart, Oklahoma. Her father was a member of the Oklahoma State Supreme Court Commission 1915–19. She had two younger sisters, Lucy (1898–ca. 1901) and Helen Lacy (1906–1988), who graduated from the University of Nebraska in 1925, received a master's degree in classical studies from the University of Chicago in 1927, and became a teacher of Latin, Greek, and English in a Chicago high school. Census records indicate that her parents were living apart in Hobart, Oklahoma, in 1910 and that they were divorced by 1920, when Clara Rummons and her daughters were living in Lincoln, Nebraska.

Constance Rummons entered the University of Nebraska in 1912 and received her bachelor of arts degree at the midwinter commencement of 1915–16. She also took some teachers' courses and in the summer session of 1916 earned the teachers' college diploma and the university teachers' certificate. She was a graduate student in 1916–17 and an assistant in philosophy 1917–19 before receiving her master's degree in May 1919 in philosophy and English literature. She was a member of the honorary literary society Chi Delta Phi, and her master's thesis appeared in the series University of Nebraska Studies in Language, Literature, and Criticism. Three years later, a year before she received her PhD in mathematics, Rummons published a lengthy article in a poetry journal. Rummons was a graduate student, presumably in mathematics, at Nebraska 1919–21 and was also an assistant instructor in mathematics 1920–21, having studied at the University of Chicago in the summer of 1920. She returned to Chicago for summer 1922 and the three quarters of the academic year 1922–23. She received her PhD from Chicago in 1923.

While Rummons was at Chicago, she met John Perry Ballantine, a fellow graduate student there; they were married at her mother's home in Lincoln, Nebraska, on September 21, 1922. J. P. Ballantine was born February 23, 1896, in Rahuri, India. His father was a medical missionary and his mother was a teacher who had taught in South Africa. He received a bachelor's degree from Harvard in 1918 and was an instructor at the University of Maine 1919–20, at Pennsylvania State College 1920–21, and at the University of Michigan 1921–22. He, too, received his PhD from the University of Chicago in 1923, with a dissertation, "A Postulational Introduction to the Four Color Problem," directed by E. H. Moore.

In 1923 the Ballantines moved to New York City, where J. P. Ballantine had a position as instructor at Columbia University 1923–26. Constance Ballantine was an instructor at Washington Square College, New York University, 1924–25. On August 31, 1926, the first of their three children, Julia Gay, was born in Lincoln, Nebraska. That same year they moved to Seattle where J. P. Ballantine began his work at the University of Washington. He was assistant professor 1926–30, associate professor 1930–38, and professor 1938–66, before his retirement in 1966.

During World War II, he served with the US Army at American military schools in England and Germany.

The second child, Frederick Winthrop, was born September 18, 1927, and the third, Charles Standish, on August 27, 1929, both in Seattle. All the children subsequently had professional careers. Julia B. Zalokar became an epidemiologist and homemaker after receiving her education at the University of Washington; Columbia University Medical School; University of Washington Medical School; San Diego State University, where she earned a master's degree; and the University of California, San Diego. She died in 1997.

Frederick W. became a computer programmer after attending the University of Washington and the University of Illinois and earning a master's degree. He died in 2006. Charles S. became a mathematician, having received his BS from the University of Washington and his PhD from Stanford. He retired from Oregon State University as professor emeritus. He died in 2008.

Within two years of moving to Seattle, Constance Ballantine was given the title of associate at the University of Washington. She held the title, which appears to have carried no specific duties, at least until 1950. Although she taught some correspondence courses, according to her younger son, anti-nepotism practices, especially during the Great Depression, played an inhibiting role in her pursuit of professional work. However, she did write a review for the *Monthly* in 1939. When the children were in school she was active in the PTA. Her hobbies were gardening, reading, word puzzles, bridge, and Scrabble. She was a member of the University Unitarian Church.

J. P. Ballantine died of Hodgkin's disease on March 11, 1970, and Constance R. Ballantine died in Seattle in January 1974, at age seventy-seven, of complications of cardiovascular disease.

Organizational affiliations: AMS, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1919 [Rummons, C.] Ethnic ideals of the British Isles. MA thesis. University of Nebraska. See also **1920**.

1923 Modular invariants of a binary group with composite modulus. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Typescript. Printed version, 1923, reprinted from *Amer. J. Math.* 45:286–93.

Publications:

1920 [Rummons, C.] *Ethnic Ideals of the British Isles*. University of Nebraska Studies in Language, Literature, and Criticism. No. 3. Lincoln, Nebraska. Published version of MA thesis.

1922 [Rummons, C.] The ballad imitations of Swinburne. *Poet Lore* 33:58–84.

1923 Modular invariants of a binary group with composite modulus. *Amer. J. Math.* 45:286–93. Published version of PhD dissertation. Reviews: *JFM* 49.0105.02 (E. Noether); *Rev. semestr. publ. math.* 31, pt. 2: 2 (E. B. Cowley).

1939 Review of *International Encyclopedia of Unified Science*, "Encyclopedia and Unified Science," vol. 1, no. 1, by O. Neurath, N. Bohr, J. Dewey, B. Russell, R. Carnap, and C. W. Morris; "Foundations of the Theory of Signs," vol. 1, no. 2, by C. W. Morris; and "Procedures of Empirical Science," vol. 1, no. 5, by V. F. Lenzen. *Amer. Math. Monthly* 46:162–63.

Other sources: Authors' questionnaire completed by Charles S. Ballantine 1992; New York University Archives; Center for Research Libraries College Catalog Collection; communications with University of Nebraska Alumni Association and University of Chicago,

Office of the University Registrar; "Judge Nestor Rummons," (Necrology) *Chronicles of Oklahoma* 8 (March 1930): 134–35; WhoWest 23 (Zalokar, Julia Ballantine); US Census 1900 NE, 1910 OK, 1920 NE, 1930 IL, WA SSDI.

Last modified: August 4, 2009.

BALLARD, Ruth (Mason). April 24, 1906–June 7, 1980.
Wellesley College (BA 1926), University of Chicago (MS 1928, PhD 1932).

Ruth Glidden Mason was born in Chicago, Illinois, the younger of two children of Bertha Hall (Sickles) (1866–1937) and Fred Bonfoy Mason (1870–1932). Her mother was in one of the earliest classes, possibly the first, at Michael Reese Hospital School of Nursing in Chicago. Her father was an 1890 graduate of Oberlin College and became an insurance agent in Chicago. They married in 1902, and their son, Ira Jenckes, was born in 1904. He attended Yale University and the University of Michigan and died in 1992.

Ruth Mason attended the Knickerbocker grammar school and Robert Waller High School, both public schools in Chicago. After her high school graduation at age sixteen, she studied one year at the University of Chicago before completing her undergraduate work in 1926 after three years at Wellesley College.

Mason immediately entered the University of Chicago where, after graduate study during the academic year 1926–27 and the spring and summer quarters of 1928, she received her master's degree in 1928. She wrote her thesis under the direction of Mayme Irwin Logsdon. During 1930–31 she was both a Horton-Hallowell fellow (from Wellesley) and a graduate fellow at Chicago. She studied one semester with D. N. Lehmer at the University of California in 1930 before finishing the work for her PhD at Chicago in 1932.

When Mason joined the MAA in 1932 she indicated that she was doing private research in Berkeley. She remained in the area doing some postdoctoral work at the University of California, Berkeley, in the years 1932–34 and taught at the College of the Holy Names (now Holy Names University) in Oakland, California, in 1933. During this period she gave her first talks on women in mathematics: in June 1933 to the Junior Mathematics Club at the University of Chicago and in November 1934 to Pi Mu Epsilon at the University of California, Berkeley. In a letter to Helen Owens of August 11, 1937, Mason wrote that "a few years ago while preparing a paper on Women in Mathematics, I realized that the really interesting part of their history is that of the progress of recent decades. Before that time a trained aptitude in mathematics was enough to make a woman a conspicuous and historical freak. Now even our maiden aunts merely think that mathematics is a somewhat odd field for a woman to work in" (Owens Papers).

Ruth Mason returned to the East and taught at Wellesley in the spring semester of 1935. Then she was an instructor at Hood College in Frederick, Maryland, 1935–36 before moving back to Illinois where, except for travel, she remained. She taught at the University of Illinois in Urbana 1936–38, as assistant the first year and instructor the second. She made a trip to Europe in summer 1938 and joined the faculty at Wright Junior College in Chicago that fall; she remained at Wright for five years. She was chairman of the mathematics section of the Illinois Association of Junior Colleges 1939–40. That same year she served as secretary-treasurer of the Chicago Mathematical Model Club and demonstrated materials for freshman mathematics that had been made under the auspices of the WPA.

On April 20, 1940, Ruth Mason married Foster K. Ballard (1899–1978), a graduate of the University of Chicago, chemist for the US Customs Service, and a long-time friend of her brother. At about this time Ruth Mason Ballard was appointed to the newly formed MAA Committee on Section Meetings; she remained on the

committee until 1947. She remained at Wright only until 1943, when circumstances required a change. Her holiday letter of 1943 describes the situation.

> Until last June there were no radical changes in our way of life.... Enrollment was falling off at Wright – Boys were leaving for the armed forces, and girls for jobs. There had once been seven faculty members in our department; by last June there were five. Then on the morning of the first day of final examinations came the order that because the Navy was taking over the building, the Wright Junior College faculty were to be out by five-thirty that evening.... The students took final examinations while the rooms were being dismantled around their heads. We finished the semester at Herzl,... a Junior College on the west side of Chicago. (letter provided to author by Fred E. Ballard)

Wright College was saved, although the enrollment dropped from about three thousand a few years earlier to about six hundred. Ballard was on leave of absence, but was teaching again in July 1943, this time in a Navy V-12 program for sailors, housed at the Illinois Institute of Technology in Chicago. She continued teaching in this program until 1945.

The Ballards' son, Fred Everett, was born on May 26, 1946. For the next few years Ruth Ballard's activities focused on playground groups, Cub Scouts, and PTA, while she continued to teach Sunday school in the Episcopal church and serve as a choir mother and member of the vestry. Throughout her life she enjoyed travel in the United States and cultural activities in Chicago: theater, museums, and opera. She was interested in mathematical puzzles and had some original ones published. She also maintained her involvement with the Women's Mathematics Club of Chicago and Vicinity.

From 1955 until her retirement in 1972, Ballard taught full time as assistant professor and then associate professor at the University of Illinois at Navy Pier (moved and renamed the University of Illinois at Chicago Circle in 1965, now the University of Illinois at Chicago). During this period she was program director in 1962–63 and president in 1963–64 of the Women's Mathematics Club. She also produced notes for an elementary college geometry course that were copyrighted in 1971.

Ruth Ballard died at seventy-four in 1980 at Rush-Presbyterian-St. Luke's Hospital in Chicago. The funeral was held in St. Augustine's Episcopal Church in Wilmette. She was survived by her son, two grandchildren, and her brother.

Organizational affiliations: AMS, MAA, NCTM, AAAS, Sigma Delta Epsilon AAUW, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1928 [Mason, R. G.] Properties of the polars and normals of pencils of plane curves. MS thesis, University of Chicago, directed by Mayme Irwin Logsdon. Typescript.

1932 [Mason, R. G.] Studies in the Waring problem. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, 1934, distributed by the University of Chicago Libraries.

Publications:

1941a Construction of objective tests in mathematics. *Natl. Math. Mag.* 16:150–56.

1941b Teaching of mathematics at the junior college level. *Sch. Sci. Math.* 41:482–86.

1943 Review of *Mathematical Recreations*, by M. Kraitchik. *Natl. Math. Mag.* 17:328.

1944a Notes from a freshman class room. *Natl. Math. Mag.* 19:91–92.
1944b Review of *Basic Geometry*, by G. D. Birkhoff and R. Beatley. *Natl. Math. Mag.* 19:52.

Abstracts not listed above:
1934 [Mason, R. G.] Further properties of ternary continued fractions. *Bull. Amer. Math. Soc.* 40:389 #206. Presented to the AMS, Berkeley, CA, 20 Jun 1934.
1939 [Mason, R. G.] Some dissection problems. *Amer. Math. Monthly* 45:402 #2. Presented to a meeting of the MAA, Carbondale, IL, 13–14 May 1938.
1940 Recreations connected with square arrays. *Amer. Math. Monthly* 47:598 #1. Presented to a meeting of the MAA, Bloomington, IL, 10–11 May 1940.

Presentations not listed above:
Mathematics and humor. Presented to the NCTM, Chicago, 22 Feb 1968.
Humor in mathematics. Presented to the NCTM, Cedar Rapids, IA, 23 Aug 1968.

References to: AmMSc 6–7, 10P–11P; AmMWSc 12P.
Obituary. *Winnetka Talk*, 12 Jun 1980.

Other sources: PhD dissertation vita 1934; Owens questionnaires 1937, 1940; Owens Papers; Wellesley College Alumnae Office; conversations with Fred E. Ballard; US Census 1910, 1930 IL.

Last modified: March 25, 2009.

BAREIS, Grace M. December 19, 1875–June 15, 1962.
Heidelberg University (BA 1897), Ohio State University (PhD 1909).

Grace Marie Bareis was born in Canal Winchester, Ohio, the first of two daughters of Amanda Jane (Schoch) (1850–1908) and George Frederick Bareis (1852–1932). Both parents were natives of Ohio. Her father was educated in district and public schools in Ohio and conducted a successful lumber business in Canal Winchester. He was a student of history and archaeology and published a history of the local township in 1902. Grace Bareis's younger sister was Helen Paul (1877–1934).

After attending the public schools in Canal Winchester, Grace Bareis studied at Heidelberg University (Heidelberg College after 1926) in Tiffin, Ohio. She took the classical course and participated in the Hesperian Literary Society and the Oratorical Association before graduating in 1897 as valedictorian of her class. Her sister graduated from Heidelberg two years later.

Grace Bareis spent the two years 1897–99 as a graduate student at Bryn Mawr College, where she contributed a paper to the Mathematical Journal Club in spring 1899. She also graduated from the Columbus Normal School in Ohio in 1899. Bareis was a teacher at Miss Roney's School in Bala, Pennsylvania, from 1899 until 1906 while continuing her graduate work in mathematics at nearby Bryn Mawr College during 1902–06. During her last two years in Pennsylvania, she submitted at least fourteen solutions to problems in the *Monthly*, seven of which were chosen to appear.

In 1906 Bareis returned to the Midwest to finish her graduate work in mathematics at Ohio State University. She was a fellow there 1906–08, was appointed assistant professor in 1908, and was the first recipient of a doctorate in mathematics from Ohio State when she received her PhD in 1909. After nearly forty years on the faculty she retired as assistant professor emeritus in 1946. During her years at Ohio State, she directed master's theses, mainly in geometry, for at least fifteen graduate students, of whom at least eight were women. Other positions she noted over the years include faculty member in the Education College, advisor for Arts College women, and group leader for freshman week. She participated in the OSU faculty club and the faculty women's club as well as the Columbus College Club. She spent the summer of 1920 at Columbia University, and in 1922 her 1909 PhD dissertation was printed. During World War II, she taught students in the Army Specialized Training Program at Ohio State, and for two years after her retirement she continued to teach because of the postwar shortage of instructors.

In 1948 Bareis gave a gift of $2000 to Ohio State University to help commemorate its seventy-fifth anniversary. She asked that the interest on her donation be used to fund the Grace M. Bareis Mathematical Prize to be awarded annually after a written contest. She believed that sophomores would benefit most from participation in such a contest.

During her lifetime Bareis remained active in her college alumni organizations; she belonged to the Ohio State alumni association, was on the Ohio State University alumni council, and from 1935 to 1956 was a member of the board of trustees of Heidelberg College. She was the second woman to hold that position: her father had been president of the board for many years before his death in 1932, and her sister, Helen Bareis, completed his term after his death. Heidelberg gave Grace Bareis an honorary degree of Doctor of Pedagogy at the hundredth anniversary of the college

in 1950, and the Bareis Hall of Science was built there in 1964 to honor her and her father. Grace Bareis had made a sizable gift towards its construction.

Although Bareis never served as an officer of the MAA or its Ohio Section, she attended many national meetings and attended more than thirty annual meetings of the section from its inception in 1916 through 1955, nine years after her retirement.

Bareis was active in church activities: she was a member of the Evangelical and Reformed Church at Canal Winchester, belonged to the Missionary Society, participated in the Business Women's Sunday School class, and was an affiliate member of the Indianola Methodist Church. She volunteered with the Red Cross and belonged to the DAR, the Ohioana Library Association, and the Franklin County Historical Society; she was a life member of the Ohio State Archeological and Historical Society. She maintained her home, and spent the summers, in Canal Winchester. At one point she described her hobbies as gardening and farming; she managed a farm near Brice, Ohio. In response to a question for her entry in *Woman's Who's Who of America* of 1914–15, Bareis indicated that she favored woman suffrage.

Grace Bareis lived for twenty-six years with a friend, her former student and later mathematics department colleague, Margaret Eloise Jones (1895–1979), in Columbus. Bareis died in 1962 at age eighty-six at her home in Columbus after a lengthy illness. Her nearest surviving relatives were cousins. Funeral services were held at the Evangelical and Reformed Church and burial was in the Union Grove Cemetery, both in Canal Winchester.

After her death, Bareis's estate was valued at $553,195, with the largest single bequest to Margaret Jones. Other bequests included several to various church and mission organizations and to educational institutions, including one to Ohio State to aid women students majoring in mathematics. In 2006 Grace Bareis was one of forty-five women mathematicians featured with an individual poster containing a brief biography at the "Connecting Women in Mathematics Across Canada" workshop held at the Fields Institute. She and Anna Pell Wheeler were the only two women in our study so honored.

Organizational affiliations: AMS, MAA (charter member), AAAS, Sigma Xi, Pi Mu Epsilon.

Dissertation:
1909 Imprimitive substitution groups of degree sixteen. PhD dissertation, Ohio State University, directed by Harry Waldo Kuhn. Printed version, Press of the New Era Printing Company, Lancaster, PA.

Publication:
1932 with Vladimir F. Ivanoff. [Reply to] A simple geometrical paradox–Proposed by J. L. Coolidge. *Amer. Math. Monthly* 39:29–31. Review: *JFM* 58.0683.05 (H. Grunsky).

Presentation:
The nature of a first course in analytic geometry. Presented to the Ohio College Association, Columbus, OH, 29 Dec 1909.

References to: AmMSc 3–8, 9P; BioWMath; WomWWA.
"Grace Bareis, 86, Claimed by Death." [Tiffin, Ohio, newspaper] 16 Jun 1962.
"Retired OSU Teacher Dies at 86." *Columbus Dispatch*, 17 Jun 1962.
"2 Women's Estates Set at $913,050." *Columbus Evening Post*, n.d.
"Grace Marie Bareis." In The Ohio State University, Department of Mathematics, *History*.

Other sources: Owens questionnaire 1937; Bryn Mawr College Archives; Ohio State University Archives; communication with Heidelberg College Archives; OhA&B (Bareis, George F.); US Census 1880, 1900, 1910, 1920, 1930 OH.

Last modified: January 15, 2016.

BARNES, Mabel (Schmeiser). July 29, 1905–February 22, 1993.
Cornell College (BA 1926), University of Wisconsin (MA 1928), Ohio State University (PhD 1931).

Mabel Frances Schmeiser was the second of six children of Christena M. (Wehmeyer) (1879–1953) and Emanuel Schmeiser (1872–1942), both Iowa natives who had married in 1902. Her mother was educated through the eighth grade, and her father, a farmer, received some elementary education. All of the children were born in Wapello, in southeastern Iowa just a few miles from the Mississippi River, and all attended college; the four oldest were graduates of Cornell College in Mount Vernon, Iowa, about sixty miles north of Wapello; the two youngest attended Iowa State University. Mabel Schmeiser's siblings were Agnes P. (1903–2002), who was a teacher; Martin L. (1907–1976), a civil engineer who also did some graduate work at Iowa State; Mary M. (1909–1991), a dietician and small business owner; L. Josephine (1912–1999), a graduate of Iowa State who was a dress designer for a department store and who was the wife of a president of Pennsylvania State University; and L. Maurice (1919–2008), who attended Iowa State for two years and became a farmer.

Mabel Schmeiser began her education in a one-room country school and graduated from the high school in Wapello in 1922 before going to Cornell College. In the spring of 1926, before her graduation, she was chosen as recipient of the mathematics department fellowship at the University of Wisconsin, where she subsequently spent the next academic year. She received her master's degree from Wisconsin in 1928 after having entered Ohio State University for further graduate work in 1927. She was at Ohio State 1927–30 and the summers of 1930 and 1931. She was a graduate assistant the first two years and a university fellow the last year.

Through a teachers' employment agency, Schmeiser found a position as professor and acting chairman of the mathematics department at Nebraska State Normal School and Teachers College (now Wayne State College) in Wayne. She was there, substituting for someone on leave of absence 1930–31, the year before finishing her dissertation and receiving her PhD from Ohio State. She continued in that position until 1933, when her predecessor returned to resume the position.

During the Depression, with jobs hard to find, Schmeiser applied to and was accepted at the recently opened Institute for Advanced Study at Princeton. She spoke about her year there, as well as other aspects of her life and career, at a panel on women in American mathematics at the centennial celebration of the AMS in Providence in 1988. She noted that there were still no jobs at the end of the academic year 1933–34, so "six men and I from the Institute and from Princeton University took a special qualifying exam to be taken on as substitutes for mathematics teachers on leave from New York City high schools. Our duties were to teach light schedules in the high schools to which we were assigned and to give jointly an alertness course, as it was called, for high school teachers. It qualified them for raises" (**1988**, 7). Schmeiser was a substitute at Wadleigh High School in Manhattan.

On July 3, 1935, Mabel Schmeiser and John Landes Barnes were married. He was born in New Jersey in 1906, had a bachelor's degree and master's degree in electrical engineering from MIT, and a master's degree and a 1934 PhD in mathematics from Princeton. They first lived in Massachusetts, where J. L. Barnes had a position

as assistant professor at Tufts College (now University). Although Mabel Barnes did not have a regular position at Tufts and normally gave her home address for the AMS membership list, in September 1938 she used the college as her mailing address. She later reported, "I kept my hand in somewhat by marking papers and substituting for [my husband] when he was away, and by helping him edit the mathematics section of Eshbach's *Handbook of Engineering Fundamentals*, second edition" (**1988**, 7).

John Barnes remained at Tufts until 1942, during which time he was promoted to professor of mathematics and served as chairman of applied mathematics as well as acting chairman of electrical engineering. During that period their two children were born. George Gared Barnes, born in December 1936 in Boston, became an engineer, having earned a bachelor's degree in physics, and master's degrees in engineering, in statistics, and in business administration. Lynne Ries Barnes Small, born in August 1940 in Philadelphia, has a PhD in mathematics from Yale and is a professor at the University of San Diego.

During World War II John Barnes was on leave from Tufts and did war work with Bell Telephone Laboratories, first in New York and then in New Jersey. They returned to Tufts after the war, and Mabel Barnes was hired as an assistant professor at Tufts for 1946–47, partly because of the influx of veterans. She later noted, "nepotism and my being a woman were overlooked. Desperation again overcame prejudice" (**1988**, 7). Although she was rehired for the next year, they moved to California where her husband had taken a position as professor in engineering at UCLA. He remained there until his retirement in 1974. In addition to many consulting positions over the years, John L. Barnes was founder and president, from 1957 until 1976, of Systems Corporation of America. He died in La Jolla in 1976 shortly before his seventieth birthday.

In 1950 Mabel Barnes resumed her career by taking a position at Occidental College in Los Angeles, where she was instructor 1950–51, lecturer 1951–52, assistant professor 1952–56, associate professor 1956–64, professor 1964–71, and then professor emeritus. In 1955 she became the editor of "Installation of New Chapters" in *Pentagon*, the journal of Kappa Mu Epsilon. She served until 1961 and was succeeded by Sister Helen Sullivan.

Lynne Barnes Small wrote in 1997 that her mother "liked to travel, especially to remote places, and took many trips with the Sierra Club and/or one of her grandsons.... The generation-skipping trips had a certain charm: picture grandmother and grandson in the 9-to-12-year-old range traveling to Alaska or to remote parts of northern Canada." Her main activity during retirement was working on conservation with both the Sierra Club and with the Desert Protective Society. She also was a volunteer at the Sherman Oaks Hospital for many years.

Mabel Barnes died in Los Angeles in 1993 at age eighty-seven.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Kappa Mu Epsilon.

Thesis and dissertation:

1928 [Schmeiser, M. F.] Multiple and iterated integrals. MA thesis, University of Wisconsin, directed by Edward Burr Van Vleck. Typescript.

1931 [Schmeiser, M. F.] Some properties of arbitrary functions concerning approach to a straight line. PhD dissertation, Ohio State University, directed by Henry Blumberg. Typescript. Abstract: *Abstracts of doctors' dissertations. The Graduate School, Ohio State University.* 7:241–51. See also **1934**.

Publications:

1934 [Schmeiser, M.] Some properties of arbitrary functions. *Fund. Math.* 22:70–76. Published version of PhD dissertation. Reviews: *JFM* 60.0194.02 (R. Schmidt); *Zbl* 008.34302 (H. Blumberg). Presented to the AMS, Cambridge, MA, 26 Dec 1933; abstract: *Bull. Amer. Math. Soc.* 40:37 #32.

1988 Mabel S. Barnes. In Centennial reflections on women in American mathematics. *AWM Newsletter* 18 (6): 6–8. Transcript of a panel discussion sponsored by the AWM at the AMS Centennial meeting, Providence, RI, 9 Aug 1988. Reprint, with editorial revisions: 2005. Fifty years in mathematics. In *Complexities*, ed. B. A. Case and A. M. Leggett, 27–30. Princeton, NJ: Princeton University Press.

References to: AmMSc 8, 9P–11P; AmMWSc 12P, BioWMath.

Other sources: PhD dissertation autobiography 1931; Owens questionnaire 1937; authors' questionnaires for Mabel S. Barnes and John L. Barnes completed by Lynne Barnes Small 1992; communication from Lynne B. Small 1997; WhoAm 39 (Barnes, John Landes); University of California: In Memoriam, September 1978 (John Landes Barnes, Engineering)

Last modified: July 19, 2009.

BARNEY, Ida. November 6, 1886–March 7, 1982.
Smith College (BA 1908), Yale University (PhD 1911).

Ida Barney was born in New Haven, Connecticut, the first of two daughters of Ida (Bushnell) (1858–1941) and Samuel Eben Barney (1859–1940), natives of Connecticut who married in 1884. Her father was born in New Haven, graduated from the Sheffield Scientific School of Yale University in 1879, served as a consultant on various engineering projects, and was on the civil engineering faculty at Yale from 1882 until his retirement in 1924. Her sister, Elizabeth Hunt (1894–1958), graduated from Smith College in 1914 and was secretary to the dean, and later to the registrar, of the Yale Divinity School.

Ida Barney attended New Haven High School 1900–04, Smith College 1904–08, and Yale Graduate School 1908–11. She was a mathematics major at Smith, where her studies included a course in general astronomy and one in the theory and use of transit instruments in addition to various ones in geometry, calculus, theory of equations, history of mathematics, and real and complex variables. Her courses at Yale included, among others, advanced theory of functions, elliptic functions, Abelian functions, and abstract thermodynamics, all from James Pierpont, who also directed her dissertation. She received her PhD from Yale in 1911.

After Barney finished her graduate work, she spent the next ten years on various mathematics faculties, starting as professor of mathematics at Rollins College in Winter Park, Florida, 1911–12. She was at Smith College for six years: as an assistant 1912–13, as instructor 1913–17, and as assistant professor 1920–21. Between her two periods of time at Smith, she was professor first at Lake Erie College in Painesville, Ohio, 1917–19, and then at Meredith College in Raleigh, North Carolina, 1919–20, where she was the only member of the department. All but Rollins College were women's colleges at the time.

Barney spent the rest of her life in or around New Haven, where she and her sister lived with their parents until their parents' deaths in the early 1940s. After that Ida Barney and her sister lived in the family home until her sister's death in 1958.

In 1921 Barney enrolled in a graduate course in astronomy at Yale, and the following year she was appointed research assistant at the Yale Observatory. She took additional graduate courses in astronomy in 1922 and 1928. Early in her tenure at the observatory she became involved in a major star mapping project under the direction of Frank Schlesinger. This project, cataloguing positions and proper motions of stars, was done with the participation of the Lick Observatory of the University of California, the US Naval Observatory, and the Royal Observatories at Greenwich and the Cape of Good Hope. Barney was coauthor with Schlesinger, and sometimes others, of twelve volumes of catalogues that appeared in the *Transactions of the Astronomical Observatory of Yale University.* The first six of these volumes, appearing 1925 though 1934, were produced before IBM punch-card machines were used to facilitate computations.

After Frank Schlesinger's retirement in 1941, Barney was named director of the project. Between 1945 and 1950 she authored another eight volumes of catalogues. In 1949 she was promoted to research associate in astronomy, with the rank of associate professor, for a five-year term. When the project was completed in 1950 it resulted in what is known as the Yale Photographic Zone catalogues. In 1951

through 1954 Barney authored a supplementary volume and two revised catalogues. She also coauthored three new catalogues, one in 1954 and two in 1959, four years after her retirement.

Barney was recognized by her colleagues for her achievements. In 1945 the American Astronomical Society created a council, and the following year Barney was elected to a three-year term on it. She was a fellow of the Royal Astronomical Society of London. In 1952 Barney was awarded the Annie J. Cannon Prize, established in 1934 and given no more often than every three years, by the American Astronomical Society. According to an item in the April 1953 issue of the *Publications of the Astronomical Society of the Pacific*, "Miss Barney was cited for her work on the ... Yale Photographic Zone Catalogue, which required a half-million measurements and twenty-three years of computation work before it was completed in 1950" (65:99). A letter to the editor of *Sky and Telescope* after Barney's death in 1982 quoted Dirk Brouwer, director of the Yale Observatory 1941–66, concerning her receipt of the prize: "It seems especially fitting that the prize named for a woman who classified a half-million spectra should be given to one who made approximately the same number of measures for the positions and motions of stars."

Ida Barney continued to live in the family house in New Haven for several years. She had no immediate survivors at the time of her death in an assisted living facility in Hamden, Connecticut, just outside New Haven, at age ninety-five in 1982. She is buried in the family plot in the Grove Street Cemetery in New Haven.

Organizational affiliations: AMS, MAA (charter member), Amer. Astron. Soc., Internat. Astron. Union, Roy. Astron. Soc., AAAS, Phi Beta Kappa, Sigma Xi.

Dissertation:

1911 Line and surface integrals. PhD dissertation, Yale University, directed by James Pelham Pierpont. Printed version, reprinted from Amer. J. Math. 36 (1914): 137–50.

Publications:

1914 An extension of Green's theorem. *Amer. J. Math.* 36:137–50. Published version of PhD dissertation. Reviews: *JFM* 45.0569.01 (T. Carleman); *Rev. semestr. publ. math.* 23, pt. 1: 1 (E. B. Cowley).

1923 The spectrum of Algol. *Astron. J.* 35:95–99.

1925–59 Yale Zone Catalogues. *Trans. Astron. Obs. Yale Univ.*, New Haven, CT: The Observatory. 4 (1925), catalogue of 8359 stars $+50^\circ$ to $+55^\circ$, with F. Schlesinger and R. H. Tucker; 3, pt. 4 (1926), catalogue of 1275 stars $+1^\circ$ to $+2^\circ$, with F. Schlesinger, C. J. Hudson, and L. Jenkins; 5 (1926), catalogue of 5833 stars $+2^\circ$ to $+1^\circ$, with F. Schlesinger, C. J. Hudson, and L. Jenkins; 7 (1930), catalogue of 7727 stars $+55^\circ$ to $+60^\circ$, with F. Schlesinger; 9 (1933), catalogue of 10358 stars $+25^\circ$ to $+30^\circ$, with F. Schlesinger; 10 (1934), catalogue of 8703 stars $+20^\circ$ to $+25^\circ$, with F. Schlesinger and C. Gesler; 11 (1939), catalogue of 8101 stars -10° to -14°, with F. Schlesinger; 12, pt. 1 (1940), catalogue of 8563 stars -14° to -18°, with F. Schlesinger; 12, pt. 2 (1940), catalogue of 4553 stars -18° to -20°, with F. Schlesinger; 13, pt. 1 (1943), catalogue of 4292 stars -20° to -22°, with F. Schlesinger; 13, pt. 2 (1943), catalogue of 9455 stars -27°, to -30°, with F. Schlesinger; 14 (1943), catalogue of 15110 stars -22° to -27°, with F. Schlesinger; 16 (1945), catalogue of 8248 stars -6° to -10°; 17 (1945), catalogue of 8108 stars -2° to -6°; 18 (1947), catalogue of 9092 stars $+15^\circ$ to $+20^\circ$; 19 (1948), catalogue of 8967 stars $+10^\circ$ to $+15^\circ$; 20 (1949), catalogue of 7996 stars $+1^\circ$ to $+5^\circ$, with errata slip; 21 (1950), catalogue of 5583 stars -2° to $+1^\circ$; 22, pt. 1 (1950), catalogue of 9060 stars $+5^\circ$ to $+9^\circ$; 22, pt. 2 (1950), catalogue of 1904 stars $+9^\circ$ to $+10^\circ$; 23 (1951), -30° to $+30^\circ$, supplementary volume; 24 (1953), revised catalogue of 10358 stars $+25^\circ$ to $+30^\circ$; 25 (1954), revised catalogue of 8703 stars $+20^\circ$ to $+25^\circ$; 26, pt. 1 (1954), catalogue of

1031 stars +85° to +90°, with A. J. J. van Woerkom; 26, pt. 2 (1959), catalogue of 8380 stars +50° to +55°, with D. Hoffleit and R. B. Jones; 27 (1959), catalogue of 8164 stars +55° to +60°, with D. Hoffleit and R. B. Jones.

1927 with J. Schilt. Discussion of the proper motions in the equatorial zone. *Astron. J.* 37:181–90.

1928a Review of *A Guide to the Constellations*, by S. G. Barton and W. H. Barton, Jr. *Science* n.s., 68:16.

1928b Review of *Romance of the Sun*, by M. Proctor. *Science* n.s., 67:444–45.

1929 Review of *Life and Work of Sir Norman Lockyer*, by T. M. Lockyer and W. L. Lockyer, with the assistance of Professor H. Dingle. *Science* n.s., 69:475–76.

1930 with J. Schilt. Analysis of the Yale proper motions in the zones between +50° and +55° and between +55° and +60°. *Astron. J.* 40:168–76.

1932 Review of *The Universe Unfolding*, by R. H. Baker. *Science* n.s., 75:641.

1938a with F. Schlesinger. An effect of a star's color upon its apparent photographic position. *Astron. J.* 47:86–88.

1938b Ernest William Brown, November 29, 1866–July 22, 1938. *The Sky* 3, no. 1: 14. Reprint 1938: *J. Roy. Astron. Soc. Canada* 32:410–12.

1939 with F. Schlesinger. On the accuracy of the proper motions in the General Catalogue, Albany, 1938. *Astron. J.* 48:51–52.

1940 with F. Schlesinger. New reductions of astrographic plates with the help of the Yale photographic catalogues. *Astron. J.* 49:39–40. Presented as "New reductions of astrographic plates with the help of recent Yale catalogues" to a meeting of Amer. Astron. Soc., New Haven, CT, 31 Dec 1930–3 Jan 1931; abstract: *Publ. Amer. Astron. Soc.* 7:14–15.

1943 Frank Schlesinger 1871–1943. *Popular Astron.* 51:409–12.

1947 On the accuracy of the proper motions in the general catalogue derived from the Yale photographic positions in the zone +9° to +20°. *Astron. J.* 52:176–77.

1949a Corrections to the Albany *General Catalogue*. *Astron. J.* 54:154–55.

1949b Investigation of the magnitude error in the declinations of the *General Catalogue* from a comparison with the Yale photographic positions. *Astron. J.* 54:150–53.

1956 Astrometric measurements on three Schmidt plates. *Mitt. Astron. Ges.* 7:38–39.

Abstracts not listed above:

1931 with F. Schlesinger. Reduction of photographic plates of very large angular dimensions. *Publ. Amer. Astron. Soc.* 7: 15. Presented to a meeting of Amer. Astron. Soc., New Haven, CT, 31 Dec 1930–3 Jan 1931.

1939 with F. Schlesinger. Progress at the Yale Observatory on the duplication of the Gesellschaft zones. *Publ. Amer. Astron. Soc.* 9:165–66. Presented to a meeting of Amer. Astron. Soc., Ann Arbor, MI, 14–17 Sept 1938.

1942a The derivation of proper motions for the Yale photographic zone catalogues between −20° and −30°. *Publ. Amer. Astron. Soc.* 10:245–46. Presented to a meeting of Amer. Astron. Soc., New Haven, CT, 12–14 June 1942.

1942b Progress at the Yale Observatory on the photographic zone catalogues between declinations −30° to +30°. *Publ. Amer. Astron. Soc.* 10:157–58. Presented to a meeting of Amer. Astron. Soc., Williams Bay, WI, 7–9 Sept 1941.

1944 Recent progress at the Yale Observatory on the photographic zone catalogues in northern declinations. *Astron. J.* 51:65. Presented to a meeting of Amer. Astron. Soc., Philadelphia, PA, 28–29 June 1944.

References to: AmMSc 3–8, 9P–11P; BiDWSci; NotWoPS; NotWoSc; WhoAmW 1–2; WhoEast 1930.

"Yale Maps Stars, Ends 23-Year Job." *New York Times*, 23 Oct 1950.

"Ida Barney." In "General Notes." *Pub. Astron. Soc. Pac.* 65 (Apr 1953): 99.

"6 at Yale to Retire." *New York Times*, 20 Mar 1955.

Warner, Deborah Jean. "Women Astronomers." *Natural History* 88, no. 5 (May 1979): 12–29.
"Barney, Ida." (Death notice) *New Haven Register*, 10 Mar 1982.
Hall, John S. "Ida Barney Remembered." *Sky and Telescope* 63, no. 6 (June 1982): 563.
"Ida Barney." (Obituary) *Smith Alumnae Quarterly* 73 (Summer 1982): 68.
Hoffleit, Dorrit. "Appendix H: Women Astronomers at Yale through 1968" and "Positions, Proper Motions, Catalogues." In *Astronomy at Yale 1701–1968*. New Haven: Connecticut Academy of Arts and Sciences, 1992.

Other sources: Owens questionnaires 1937, 1940; Meredith College Archives; Smith College Archives; Yale University Archives; Grove Street Cemetery, New Haven; communications with New Haven Free Public Library and with Rollins College Archives; CurBio 1940 (Barney, Samuel E.); US Census 1900, 1910, 1920, 1930 CT, 1920 NC; SSDI.

Last modified: March 6, 2009.

BARNUM, Charlotte C. May 17, 1860–March 27, 1934.
Vassar College (BA 1881), Yale University (PhD 1895).

Charlotte Cynthia Barnum was born in Phillipston, Massachusetts, the third of four children of Charlotte (Betts) (1823–1899), of Connecticut, and Samuel Weed Barnum (1820–1891), born in New York. Two brothers of her mother received MD's from Yale in the 1840s. Samuel Weed Barnum received a BA in 1841 from Yale and a BD in 1844 from the Yale Divinity School. Her parents married in 1849; their other children were Samuel Horace (b. 1852), Thomas Rossiter (1857–1938), and Clara Louisa (1866–1953). The two sons graduated from Yale in 1875 and 1879, respectively, and the younger daughter graduated from Vassar in 1888 and attended the Yale graduate school 1892–94. Samuel Weed Barnum was pastor of Congregational churches in Connecticut and Massachusetts before moving to New Haven in 1865. He was engaged in various editorial projects, including the 1847 revision of *Webster's Dictionary*, *Smith's Comprehensive Dictionary of the Bible* (1868), and *Webster's International Dictionary* (1890).

Charlotte Barnum attended Hillhouse High School in New Haven before enrolling at Vassar College in 1877 and graduating in 1881. Following her graduation she taught at Betts Academy, a boys' preparatory school in Stamford, Connecticut, 1881–82. She also taught at Hillhouse High School in 1883 and 1885–86. She did computing for the Yale Observatory 1883–85 and, also in 1885, computed angles of crystals for a revision of James Dwight Dana's *System of Mineralogy*. She worked in 1886–90, and again in 1897, as editorial assistant on *Webster's International Dictionary*. During the academic year 1889–90, Barnum was a teacher of astronomy at Smith College.

In 1890 Charlotte Barnum requested that she be allowed to take courses at the Johns Hopkins University. However, in 1890 Johns Hopkins did not officially admit women, even for graduate work, and was not to do so for another seventeen years. Barnum was supported in her request by Simon Newcomb, professor of mathematics and astronomy at Johns Hopkins, who wrote to President Daniel Coit Gilman on November 6, 1890, making an argument for allowing qualified women to study mathematics and astronomy at the graduate level at the university. He added, "The immediate occasion of this communication is the residence in Baltimore of Miss Barnum, whom I believe you have seen, as a candidate for instruction. I would like to submit a special request that Drs. [Thomas] Craig and [Fabian] Franklin be allowed to admit [Miss Barnum] to their post-graduate classes without committing the university to any policy as to future cases of the same class. And, as a reason for this course I may say that I know of no inconvenience that would thus arise" (MS 137, Johns Hopkins University Collection, Special Collections, Sheridan Libraries, The Johns Hopkins University). In December the executive committee of the board of trustees voted that Barnum be allowed to attend Dr. Craig's lectures without enrollment and without a charge for tuition. Consequently, she studied mathematical astronomy and physics at Johns Hopkins University 1890–92.

Wishing to earn a degree, however, Barnum entered Yale University in 1892, the first year women were officially admitted to the graduate school there. Her sister, Clara, who had graduated from Vassar in 1888, also attended the Yale Graduate School in 1892–94; her studies were interrupted by illness. In late August 1893,

Charlotte Barnum attended the International Mathematical Congress held in connection with the World's Columbian Exposition in Chicago. She was one of four women, of forty-five in total attendance. During her first two years at Yale, Charlotte Barnum's course work was taken with Hubert A. Newton (Integral Calculus and Mechanics; Celestial Mechanics; Shooting Stars and Meteors); J. Willard Gibbs (Vector Analysis; Multiple Algebra); and Andrew W. Phillips (Analytic Geometry; Salmon's Conic Sections; Theory of Functions; Higher Plane Curves). In her last year, she took courses in the Theory of Numbers with Irving Fisher, a young assistant professor, and in the Theory of Functions with James Pierpont, an 1894 Vienna PhD and first-year lecturer at Yale. It is unclear from the record who directed her dissertation. She received her PhD in 1895.

In 1895–96 Barnum was an instructor of mathematics at Carleton College in Northfield, Minnesota. After this one year of college teaching, she spent most of the remainder of her career working in applied areas of mathematics and in editorial work. Many of the following details are reported in the Yale Obituary Record. She joined the American Institute of Actuaries in 1898 and worked as an actuarial computer for the Massachusetts Mutual Life Insurance Company, Springfield, in 1898 and for the Fidelity Mutual Life Insurance Company, Philadelphia, 1900–01. The AMS membership lists during this period do not indicate any employers, but do list Barnum's address in New Haven in January 1898 and 1899, in Stamford, Connecticut, in January 1900, and in Philadelphia in January 1901. From 1901 to 1913 she was in Washington, D.C.: as a computer for the US Naval Observatory in 1901 and for the tidal division of the US Coast and Geodetic Survey 1901–08, and as editorial assistant in the biological survey for the US Department of Agriculture 1908–13, where she "wrote articles on tides, currents, annuities, and social legislation" (Williams Papers). An article she wrote suggesting a limit on the amount of money working women should spend on clothing appeared in the journal of the Women's Trade Union League in 1911. She also did editorial work on books by the Carnegie Institution of Washington. Although Barnum was at the US Naval Observatory for less than a year, she is one of twelve women profiled in "The Contributions of Women to the United States Naval Observatory: The Early Years."

Barnum indicated in her last entry in *American Men of Science* that from 1914 to 1926 she was an editor and proofreader of scientific works. From 1914 until 1918 she was, for the most part, in New Haven and engaged mainly in editorial work: for the Yale Peruvian Expeditions 1914–15, for the Yale University secretary's office 1915–16, and for the Yale University Press in 1915 and 1918–19. AMS membership lists indicate the following. From January 1914 through January 1916 her address is in New Haven, but the January 1917 AMS membership list puts her in New York City as a consulting actuary; her address remains in New York City through December 1922, although no positions are listed. In October 1926 she is again using a New Haven address. In a letter of January 14, 1920, she wrote that she had "worked for a year here in New York on the Chronicles of America, published by the Press" and that she had just finished editing a book on labor unrest (Charlotte C. Barnum to Miss Margaret Corwin, Graduate School of Arts and Sciences, Yale University, Student Records (RU 262), Manuscripts and Archives, Yale University Library). She taught in 1922 in the Scoville and the Columbia preparatory schools in New York and in 1923 in the Walnut Hill School in Natick, Massachusetts.

Barnum was one of the early members of the AMS, having been admitted in October 1894, about three years after the first women joined the society. During her life she was involved in various social and charitable activities; these included the Associated Charities and the National Conference of Charities and Corrections (now the National Conference on Social Welfare). When she was living in New York she was a member of the Women's Joint Legislative Commission [for Equal Rights] and of the Broadway Tabernacle, a Congregational church known for its social activism.

Barnum died of cerebrospinal meningitis at seventy-three in Middletown, Connecticut, in 1934. She was survived by her two brothers and her sister and is buried in the Grove Street Cemetery in New Haven.

Organizational affiliations: AMS, Amer. Inst. of Actuaries, AAAS (fellow), ACA (later AAUW), Phi Beta Kappa.

Dissertation:
1895 Functions having lines or surfaces of discontinuity. PhD dissertation, Yale University.

Publication:
1911 The girl who lives at home: Two suggestions to trade union women. *Life and Labor* 1:346.

References to: AmMSc 1–5; AmWomSc; BiDWSci; BioWMath; WhoAm 1; WomSc-Search; WomWWA.
"Charlotte Cynthia Barnum, B.A. Vassar College 1881." *Alumnae Graduate School Yale University: 1894–1920*. New Haven: Yale University, 1920.
"Charlotte Cynthia Barnum, Ph.D. 1895." *Yale Obituary Record* 1933–1934.
Whitman, Betsey S. "Women in the American Mathematical Society before 1900." Pt. 2. *AWM Newsletter* 13 (Sep-Oct 1983): 7–9.

Other sources: Williams Papers; Ferdinand Hamburger Archives, The Johns Hopkins University; Manuscripts and Archives, Yale University Library; Grove Street Cemetery, New Haven; "The Contributions of Women to the United States Naval Observatory: The Early Years"; NCAB 10 (1909) (Barnum, Samuel Weed); US Census 1860 MA, 1870, 1880, 1900 CT, 1900 PA, 1930 CT.

Last modified: August 21, 2010.

BARTON, Helen. August 9, 1891–March 19, 1971.
Goucher College (BA 1913), Johns Hopkins University (MA 1922, PhD 1926).

Martha Helen Barton was born in Baltimore, Maryland, the daughter of Mary Irene (Eichelberger) (b. 1860) and James Sheridan Barton (b. 1858), both Maryland natives. She had an older brother, Alan Eichelberger (1889–1964), and a younger sister, Vola Price (1893–1982), also born in Maryland, presumably in Baltimore, where her family made its home. In 1900 her parents had been married eleven years. At that time her father's occupation was listed as groceryman; in 1910 he was a coal merchant and in 1920 a retail merchant, general store. Her brother became a contractor in Baltimore, and her sister became a college physics professor.

Helen Barton received her primary and secondary education in the public schools of Baltimore and graduated with honors from Western High School. She attended Goucher College (Woman's College of Baltimore until 1910) as a Western High School alumnae scholar 1909–11 and graduated in 1913, a member of Phi Beta Kappa. While Barton was a student at Goucher, two faculty members there were awarded PhD's in mathematics at Johns Hopkins; they were Clara L. Bacon in 1911 and Florence P. Lewis in 1913. Barton mentioned in a letter of Sept 22, 1937, to Helen Owens that Clara Bacon "was my beloved teacher at Goucher and has been a real friend through these many years." The year after her graduation Barton served as an assistant in physics at Goucher and the following year, 1914–15, did graduate work in mathematics and physics as a Goucher alumnae fellow at the Johns Hopkins University. In 1915 her sister, Vola Price Barton, graduated from Goucher with a major in mathematics, also as a member of Phi Beta Kappa. Vola Barton earned a master's degree from Mount Holyoke College in 1917 and immediately was hired at Goucher; she earned a PhD in physics from Johns Hopkins in 1923 and served as professor of physics and department chairman at Goucher before her retirement in 1958.

From 1915 until 1919 Helen Barton served as head of the department of chemistry and physics at Salem College, a private college for women in Winston-Salem, North Carolina. The following two years she was an instructor in mathematics at Wellesley College. She continued her graduate work at Johns Hopkins during the summers of 1920 and 1921 and did some graduate work at Harvard University during the winter of 1921 while also teaching at Wellesley. She received the master's degree in June 1922 from Johns Hopkins.

Barton left her position at Wellesley in 1921 and moved to Albion College in Michigan, where she was associate professor of mathematics and dean of women 1921–25. In 1925 she resumed her full-time graduate work at Johns Hopkins and was a university scholar for the year 1925–26. Her language requirements in French and German were approved in October 1925; and she passed written and oral examinations in mathematics as principal subject, physics as first subordinate subject, and applied mathematics as second subordinate subject in May 1926. In a letter of May 13, 1926, recommending the acceptance of her dissertation, Frank Morley and Francis D. Murnaghan wrote that she "has considerably simplified the exposition of Grassmann's theory of extensive magnitudes by the use of [the generalized Kronecker symbol]" (Ferdinand Hamburger Archives of The Johns Hopkins University, RG 13.010, Office of the Registrar, Subgroup 1, Series 2, [Barton, Helen]).

The doctorate was awarded in June 1926. Barton spent the following year as professor and head of the department at Alabama College, then a college for women in Montevallo, Alabama; it is now the coeducational University of Montevallo.

In 1927 Helen Barton joined the faculty of the North Carolina College for Women (later Woman's College of the University of North Carolina and now the University of North Carolina at Greensboro), where she was to remain until her retirement. She began her career there as associate professor and acting head of the department, and the following year, 1928, became professor and head of the department. She retired as professor emeritus at age sixty-eight in 1960 but continued teaching part time.

In addition to teaching and chairing the mathematics department, Barton was active both on campus and in various professional groups. She was president of the faculty science club at Woman's College 1929–30 and was president of the campus chapter of Phi Beta Kappa. Later in her career Barton was chairman of the faculty planning committee for the new McIver classroom building, and the faculty lounge in McIver was named in her honor in 1960. Barton was on the accrediting committee of AAUW and was a member of the North Carolina Education Association, serving as president of the mathematics section 1933–34. She was also an active member of the North Carolina Academy of Science and was vice president 1933–34; she was president 1928–29 and secretary 1931–32 of the mathematics section; and she was elected a life member of the Academy in 1961.

At one point after her most active period in professional organizations but before her retirement, Barton described her hobbies as "travel when I can find time and money at the same time" (University of North Carolina at Greensboro Archives). Her travel included a trip in the summer of 1958 to the Canadian Rockies, Glacier National Park, Lake Louise, Banff, and Jasper National Park. She was a member of a Methodist church in Baltimore but attended the Presbyterian Church of the Covenant in Greensboro.

Helen Barton died at the Greensboro Convalescent Center at age seventy-nine after a long illness and was buried in Baltimore, where her surviving sibling, Vola P. Barton, still lived. Helen Barton left $5000 to the University of North Carolina at Greensboro to establish the Helen Barton Mathematics Scholarship Fund. A second bequest of $500 was made to the Helen Barton Professorship Fund, which was established in 1962 and helps support the Helen Barton Excellence Professorship.

Organizational affiliations: AMS, MAA (charter member), AAUP, AAUW, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1922 The fundamental theorem of algebra. MA thesis, Johns Hopkins University, directed by Frank Morley. Handwritten.

1926 Some applications of the generalized Kronecker symbol. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Printed version, 1927, reprinted from *Amer. J. Math.* 49:598–614.

Publications:

1915 On a degenerate curve. *Johns Hopkins Univ. Circular* 7:22–26. Review: *JFM* 45.0838.03 (W. Fr. Meyer).

1926a Generalization of Kronecker's relation among the minors of a symmetric determinant. *Proc. Natl. Acad. Sci. USA* 12:393–97. Based on part of PhD dissertation. Review: *JFM* 52.0086.02 (K. Fenchel-Sperling).

1926b On a circle attached to a collapsible four-bar. *Amer. Math. Monthly* 33:462–65. Review: *Rev. semestr. publ. math.* 34, pt. 1: 22 (R. C. Archibald).
1927 A modern presentation of Grassmann's tensor analysis. *Amer. J. Math.* 49:598–614. Published version of PhD dissertation. Reviews: *JFM* 53.0713.03 (J. Radon); *Rev. semestr. publ. math.* 34, pt. 1: 2 (W. G. J. ten Pas).

References to: AmMSc 5–8, 9P–11P; AmWom 1935–40; WhoAmW 1; WhAm 9.
"Dr. Barton Dies at 79." *Greensboro Record*, 20 Mar 1971.
"Ex-UNC–G Professor Dies at 79." *Greensboro Daily News*, 21 Mar 1971.

Other sources: MA thesis vita 1922; PhD dissertation biographical note 1926; Owens questionnaires 1937, 1940; Owens Papers; Cockey, "Mathematics at Goucher"; Ferdinand Hamburger Archives, The Johns Hopkins University; University of North Carolina at Greensboro Archives; communication with Goucher College Alumnae Office; US Census 1900, 1910, 1920, 1930 MD.

Last modified: March 6, 2009.

BAXTER, Elizabeth (Pillsbury). June 8, 1906–April 14, 1966.
Bryn Mawr College (BA 1927), University of Michigan (MA 1935, PhD 1939).

Margaret Elizabeth Pillsbury was born in Ann Arbor, Michigan, the elder of two children of Margaret May (Milbank) (1880–1972), born in New York, and Walter Bowers Pillsbury (1872–1960), born in Iowa. Her mother earned a BA degree from the University of Michigan in 1905, and her parents married in June of that year. Her father, who had received a BA from the University of Nebraska in 1892 and a PhD from Cornell in 1896, was appointed to the department of philosophy and psychology at the University of Michigan in 1897. He became the chairman of the psychology department when the disciplines were separated in the 1920s and remained on the faculty at Michigan until his retirement in 1942. His interests lay primarily in reasoning and attention; he was starred in the fifth edition of *American Men of Science* and was a member of the National Academy of Sciences. A son, Walter Milbank, was born in 1919 in Ann Arbor, held an MBA from Harvard University, was a management officer with the US Department of the Army, and died in 1969 in Washington, D.C.

After Elizabeth Pillsbury's graduation from Ann Arbor High School, she entered Bryn Mawr College. While there she held a James E. Rhoads junior scholarship and three scholarships her senior year: the Charles S. Hinchman memorial scholarship, the Elizabeth S. Shippen scholarship in science, and the Elizabeth Wilson White memorial scholarship. Pillsbury graduated summa cum laude in mathematics and chemistry in 1927.

Elizabeth Pillsbury first enrolled at the University of Michigan in the summer of 1927. She also studied at Göttingen in 1927 and in Berlin in 1928. From 1928 to 1932 she was a graduate student in chemistry at the University of California in Berkeley. Also during this period she married, in 1930, Warren Phelps Baxter, born in Montreal in 1901, a chemist who had received a PhD from the California Institute of Technology in 1928. In 1930 he was a chemist for Shell Development, the research division of Shell Oil Company, in Emeryville, near Berkeley, California. In 1949, while employed by National Technical Laboratories in South Pasadena, he and a colleague patented a glass electrode to measure pH in highly alkaline solutions. Elizabeth and Warren Baxter had a daughter, Margaret Elizabeth, in 1934, and a son, John Walter, in 1939.

In summer 1935 Baxter enrolled as a candidate for a master's degree in mathematics at the University of Michigan. Since she was given credit for some of her work at California, she received the master's degree from Michigan in 1935. She continued her work there in the academic year 1935–36, the summers of 1936 and 1937, and part time in the second semester of 1937–38. She completed her dissertation in 1938 and received the PhD from Michigan in February 1939.

From 1945 to 1947 Elizabeth Baxter worked as a research analyst for the Douglas Aircraft Company. In 1947 she was hired by the Jet Propulsion Laboratory at the California Institute of Technology. The following year she registered for a three-day symposium on modern calculating machinery and numerical methods that provided the participants information about then current ultra-high-speed numerical calculation. Baxter was a theoretical analyst 1947–50 and a research engineer after 1950, working mainly in the area of numerical analysis.

Having worked as an engineer for eighteen years, Elizabeth Baxter died at fifty-nine in April 1966 as a result of colon cancer and liver cancer of two years duration. She died in the Don Carlos Convalescent and Nursing Home in Pasadena, California, and was cremated. Warren P. Baxter had died two months earlier.

Organizational affiliation: SIAM.

Dissertation:
1938 On the geometry of the Dirac equations. PhD dissertation, University of Michigan, directed by George Yuri Rainich. PhD granted 1939.

References to: AmMSc 8, 9P–11P.

Related manuscript material:
Walter Bowers Pillsbury Papers, 1858–1960, Bentley Historical Library, University of Michigan.

Other sources: Bryn Mawr College Archives; University of Michigan Archives and Alumni Records Office; communication with Bryn Mawr College Alumnae Association; NatCAB 44 (Pillsbury, Walter Bowers); WhAm 4 (Pillsbury, Walter Bowers); AmMSc 5 (Baxter, Dr. Warren Phelps); US Census 1900 NY, 1910, 1920, 1930 MI, 1930 CA; California death certificate.

Last modified: December 8, 2008.

BEATY, Marjorie (Heckel). January 21, 1906–July 18, 2002.
University of Rochester (BA 1928, MA 1929), University of Colorado (PhD 1939).

Marjorie Louise Heckel was born in Buffalo, New York, the daughter of Josephine Mary (Fisher) (1874–1949) and Henry George Heckel (1875–1943), both natives of New York State. Her father was manager of a furniture store. A brother, George Philip, was three years younger than she, became a physician in Rochester, and died in 1963.

Marjorie Heckel attended grade school and a year of high school in Buffalo. Her family then moved to Rochester, New York, where she graduated from East High School. She attended the University of Rochester on a state scholarship and received her bachelor's degree with a major in mathematics in 1928. She remained for a year after her graduation to complete her master's degree. Heckel then went to Brown University to continue her graduate studies. She was an assistant there for two years, 1929–31, but had to leave for financial reasons.

Heckel took a position as instructor at the University of South Dakota in the fall of 1931. "She came by train from New York and arrived at a university quite different from the way it is today. For one thing, she and ... Harry Lane were the only instructors the mathematical sciences department had. Also, it was a year of drought in South Dakota when [she] arrived so the campus was very dry and dusty with only a few buildings compared to how many there are today" (Krebs, "A century and a half of dedication," 2). In her second year there she met Donald W. Beaty (1903–1979), a cattle feeder and farmer who was teaching some courses at the university. They married on March 30, 1933, and according to Krebs, "her marriage forced [her] to resign her position at the university because during the depression only one member of a household was allowed to hold a job" (p. 2). Krebs reported that the university needed another mathematics instructor during the year 1934–35, and Beaty volunteered to teach one course for a semester without pay.

Marjorie Beaty studied at the University of Colorado during 1935–38. It appears that she was a university fellow and teaching assistant her first year, a research fellow her second year, and a teaching assistant her third year. Her dissertation, one of four directed by Aubrey Kempner at Colorado, resulted in a PhD in 1939. The only other Colorado doctorate in mathematics earned by a woman before 1960 went to Laura Louise Johnson (Rosenbaum), Kempner's other 1939 PhD student. Beaty and Johnson earned the third and fourth PhD's given in mathematics at Colorado.

Beaty returned to the mathematics department at the University of South Dakota as acting head in 1938–39; she was assistant professor 1938–41 and was acting dean of women for one semester in 1941. Shortly thereafter she took an extended leave to raise her two daughters, Debra, born in 1943, and Mary, born in 1944. Beaty returned to the department as assistant professor in 1955, was promoted to associate professor in 1958, and to professor in 1961. She retired in 1976, but taught at nearby Yankton College for a number of years after her retirement.

In 1965 Beaty delivered the thirteenth annual lecture on liberal education, "Progress and the Professor," to the College of Arts and Sciences at the University of South Dakota. She was a recipient of an Outstanding Educator of America award in 1974.

She spoke at the 1982 summer commencement at the University of South Dakota; in conjunction with the commencement, her daughters donated funds to the university to set up the Dr. Marjorie H. Beaty Mathematics Scholarship to be given to a mathematics major each year, with preference given to residents of South Dakota. The university's Phi Beta Kappa chapter also gives the Marjorie H. Beaty award to a senior who plans to pursue graduate work there. After her retirement, Beaty continued her contributions to the university. She served on the board of directors of the university's America's Shrine to Music Museum, helped to create the Emeritus Club Shakespeare Garden, and was chair of the university's Centennial of South Dakota. She and her late husband were awarded the University of South Dakota Foundation's Inman Award in 1998 in recognition of their contributions to the university.

In about 1940 Beaty reported that she was Congregationalist and a Republican and that her favorite recreation was hunting. Her husband served as a Republican state senator from 1943 through 1948, and from 1950 to 1976 she served as the secretary to the Clay County Republican Central Committee. She was a founding member of the Eta chapter of South Dakota of Delta Kappa Gamma, a professional honor society for women educators, and received that society's state achievement award in 1985. She held memberships in the South Dakota Academy of Science, Alpha Lambda Delta, Omicron Delta Kappa, Mortar Board, Order of the Eastern Star, and the social sorority Chi Omega. She also belonged to P.E.O. (philanthropic educational organization) Sisterhood, a society promoting educational opportunities for women, and served as president of the local Vermillion chapter; she remained a member more than fifty years. She joined the AMS in 1929 as a nominee of Brown University and maintained her membership until her death.

Marjorie Beaty died at the Sioux Valley Vermillion Care Center in Vermillion, South Dakota, in 2002 at age ninety-six. A service was held at the United Church of Christ (Congregational), and she was buried in the Bluff View Cemetery in Vermillion. Beaty was survived by her two daughters, six grandchildren, a nephew, and two nieces.

Organizational affiliations: AMS, Sigma Delta Epsilon, AAUW, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1929 [Heckel, M.] Tetracyclical coordinates. MA thesis, University of Rochester.
1939 On the complex roots of algebraic equations. PhD dissertation, University of Colorado, directed by Aubrey Kempner. Typescript.

Publications:
1958 with J. A. Martin. Space dualization of a system involving three mutually perspective triangles. *Proc. South Dakota Acad. Sci.* 37:131–34.
1959 with D. L. Henderson. Study based on the trilinear coordinate system. *Proc. South Dakota Acad. Sci.* 38:198–202.

Abstract not listed above:
1937 Remarks on the calculation of π. *Amer. Math. Monthly* 44:415 #12. Presented to a meeting of the MAA, Greeley, CO, 16–17 Apr 1937.

Presentation:
1965 Progress and the Professor. Vermillion, SD: College of Arts and Sciences, University of South Dakota. Annual Lecture on Liberal Education presented 24 Feb 1965.

References to: AmMSc 7, 9P–11P; AmMWSc 12P–13P, 14; AmWom 1935–40; OutEdAm 1974; WhoAmW 8, 10–11; WhoMW 16–17.
"Dr. Marjorie Beaty." (Obituary) *Vermillion* (*SD*) *Plain Talk*, 25 Jul 2002.
"Dr. Marjorie Beaty." (Obituary) *Rapid City* (*SD*) *Journal*, 19 Jul 2002.

Other sources: Jones and Thron, *A History of the Mathematics Departments of the University of Colorado*; Sally Krebs, "A century and a half of dedication," April 1987 (typescript); US Census 1910, 1920, 1930 NY, 1930 SD.

Last modified: January 22, 2016.

BECHTOLSHEIM, Lulu (Hofmann). May 27, 1902–August 29, 1989.
Realgymnasium der Schillerschule (Frankfurt am Main) (*Abitur* 1922), Universität Zürich (PhD 1927).

Lulu Hofmann was the middle daughter of Clara (Olshauson) (1875–1938) and Otto Hofmann (1863–1956). Her parents were born in Germany, her mother in Mertschütz and her father in Frankfurt-am-Main. Her mother was the daughter of a theologian; she attended a Lyzeum, a secondary school for girls, and became a homemaker after her marriage in 1897. Her father attended a Gymnasium, the classical German secondary school, and was a stockbroker. Lulu Hofman and her older sister, Emy (1900–1994), were both born in New York City. Her younger sister, Ilse, was born in 1910 in Frankfort, Germany. Both sisters attended the same Gymnasium in Frankfort as Lulu; her older sister also attended an academy of art in Karlsruhe, and her younger sister studied at universities in Brussels and in Paris; they later married and became homemakers. Her older sister was also a painter, and her younger sister was a certified translator. Her parents were supportive of their daughters' higher education.

Hofmann was raised bilingually in German and English and received her complete education in Germany and Switzerland. She attended the Realgymnasium der Schillerschule in Frankfurt and passed her Abitur, allowing her to attend university, in 1922. She then attended the Universität Freiburg 1922–23 and the Universität Zürich 1923–26. During 1924–26 she also studied part time at the Eidgenössiche Technische Hochschule (ETH) in Zurich, where Hermann Weyl held the chair in mathematics until 1930, when he took the chair at Göttingen that was vacated when Hilbert retired. Starting in 1926, Hofmann assisted Weyl in translating German manuscripts into English. Hofmann received her doctorate from the Universität Zürich in 1927 with a dissertation directed by E. G. Togliatti, who was on the faculty 1924–26. While there she also studied philosophy under Edmund Husserl and Martin Heidegger. A niece later indicated that Hofmann had described Weyl as someone with whom she had worked closely, both as a student and afterwards.

Lulu Hofmann returned to the United States in January 1927 and gave an address of Springfield, Ohio, when she applied for membership in the AMS that spring. She was at Columbia University as an assistant in mathematics 1927–28 and as a lecturer 1928–29; she was an instructor at Barnard College 1929–37. She worked closely with Edward Kasner of Columbia in that period, assisting him with a paper that appeared in the *Transactions* of the AMS in 1928, and doing joint work with him. Hofmann also continued to assist Weyl, and in a published version of lectures he delivered at Yale University in 1931 he wrote: "I do not want to omit acknowledging my indebtedness to my friend, Dr. Lulu Hofmann of Columbia University, ... for the devoted assistance which she has rendered me in the translation of my manuscripts into English on this as well as on similar previous occasions" (*The Open World*, v). In 1933 Weyl came from Göttingen to the Institute for Advanced Study, and Hofmann continued to help him with English. She later translated his book *Symmetry* into German.

In November 1936 Lulu Hofmann married Baron Wilhelm Alfred von Bechtolsheim (1881–1968). He was born in Upper Bavaria, the son of the Chamberlain for the Grand Duke of Luxemburg and later for the King of Bavaria. Baron von Bechtolsheim had been a Commander in the Imperial German Navy until 1921 and

immigrated to the United States in 1926. He later was a pharmaceutical salesman. They had no children, although he had children by a previous marriage.

During the summer session of 1937 Lulu von Bechtolsheim was an instructor at Hunter College. She wrote in 1937 that she was then writing a textbook on analytic geometry that was different from current texts, and that the material had been used in her classes during the last three terms. That fall she became an instructor at Queens College where she remained until 1940. She made a trip to Europe in summer 1938. By 1944 she and her husband had moved to California, where, during the winter quarter of 1943–44, she was a lecturer in mathematics at Stanford University. Lulu Bechtolsheim, as she was then known, spent the largest part of her career at the University of Redlands, east of Los Angeles. She was assistant professor 1944–50, associate professor 1950–56, and professor 1956–61, before her retirement in 1961. In addition to her role as a mathematics professor, she also taught astronomy, Italian, French, and German at Redlands and knew some Spanish, Portuguese, and Greek. She served, as well, on the honors committee and committee on comprehensive examinations. She also was an acting assistant professor of mathematics at Stanford in summer 1947 and attended an institute for college mathematics teachers at Stanford in summer 1955.

After her retirement, Bechtolsheim continued her scholarly activity, mainly by engaging in a variety of translations of mathematical manuscripts: by Leopold Nachbin from Portuguese into English, by George Pólya from English into German, and by Bruno de Finetti from Italian into German. The translations into German appeared in the Wissenschaft und Kultur series published by Birkhäuser Verlag.

Bechtolsheim was interested in poetry. From 1972 she was a member of the Anthroposophical Society, an organization promoting the spiritual philosophy based on the works of Rudolf Steiner, and from 1981 she belonged to the Christian Community, inspired by his work as well.

Lulu Bechtolsheim died following an intestinal blockage in 1989 at age eighty-seven in Redlands, California. She was survived by two step-sons in West Germany and a sister. Services were held at the Christian Community Church in North Hollywood, and interment was at Hillside Memorial Park.

Organizational affiliations: AMS, MAA, AAUP, Sigma Xi.

Dissertation:

1927 [Hofmann, L.] Über einige spezielle Strahlenkongruenzen, die mit analytischen Funktionen zusammenhängen. PhD dissertation, Universität Zürich, directed by Eugenio Giuseppe Togliatti. Printed by G. Leemann, Zürich. Review: *JFM* 53.0318.02 (G. Feigl).

Publications:

1928a [Hofmann, L.] Synthetic proof of Professor Kasner's pentagon theorem. *Amer. Math. Monthly* 35:356–58. Review: *JFM* 54.0675.04 (G. Feigl).

1928b [Hofmann, L.] with E. Kasner. Homographic circles or clocks. *Bull. Amer. Math. Soc.* 34:495–503. Reviews: *JFM* 55.0794.03 (F. Lösch); *Rev. semestr. publ. math.* 34, pt. 1: 38 (R. C. Archibald). Presented as "Homographic circles" to the AMS, New York City, 25 Feb 1928.

1929a [Hofmann, L.] On a certain metric aspect of plane projective transformations. *Bull. Amer. Math. Soc.* 35:391–400. Reviews: *JFM* 55.0353.03 (E. Pannwitz); *Rev. semestr. publ. math.* 35:16 (D. J. Korteweg). Presented as "Remarks on a certain aspect of plane projective transformations" to the AMS, New York City, 27 Oct 1928; abstract: *Bull. Amer. Math. Soc.* 35:5–6 #8.

1929b [Hofmann, L.] Review of *Mathematich-naturwissenschaftlich-technische Bücherei*, by O. Salle. *Amer. Math. Monthly* 36:280–81.
1955 (Translator from the English) *Symmetrie*, by H. Weyl. Basel: Birkhäuser Verlag. Second German ed. (reprint): 1981. Basel: Birkhäuser Verlag. Review: *Zbl* 522.20001 (W. Kugler).
1962 (Translator from the English) *Mathematik und plausibles Schliessen. Band I: Induktion und Analogie in der Mathematik*, by G. Pólya. Basel: Birkhäuser Verlag. Second ed.: 1969. Basel: Birkhäuser Verlag. Third ed.: 1988. Basel: Birkhäuser Verlag.
1963 (Translator from the English) *Mathematik und plausibles Schliessen. Band II: Typen und Strukturen plausibler Folgerung*, by G. Pólya. Basel: Birkhäuser Verlag. Second enl. ed.: 1975. Basel: Birkhäuser Verlag.
1965a (Translator from the Portuguese) *The Haar Integral*, by L. Nachbin. Princeton, NJ: Van Nostrand. Review: *Zbl* 127.07602 (H. Boseck). Reprint: 1976. Huntington, NY: Robert E. Krieger Publishing Co.
1965b (Translator from the Portuguese) *Topology and Order*, by L. Nachbin. Van Nostrand Mathematical Series 4. Princeton, N.J.: Van Nostrand. Reviews: *MR* 36 #2125 (D. R. Brown); *Zbl* 131.37903 (L. E. Ward, Jr.). Reprint: 1976. Huntington, NY: Robert E. Krieger Publishing Co.
1966 (Translator from the English) *Vom Lösen mathematischer Aufgaben. Einsicht und Entdeckung, Lernen und Lehren. Band I*, by G. Pólya. Basel: Birkhäuser Verlag. Second ed. (reprint): 1979. Basel: Birkhäuser Verlag.
1967 (Translator from the English) *Vom Lösen mathematischer Aufgaben. Einsicht und Entdeckung, Lernen und Lehren. Band II*, by G. Pólya. Basel: Birkhäuser Verlag. Second ed. (reprint): 1983. Basel: Birkhäuser Verlag.
1974 (Translator from the Italian) *Die Kunst des Sehens in der Mathematik*, by B. de Finetti. Basel: Birkhäuser Verlag. Review: *Zbl* 279.00001 (K. Strubecker).

Abstracts not listed above:
1927 [Hofmann, L.] On some special congruences of rays connected with analytic functions. *Bull. Amer. Math. Soc.* 33:399 #48. Presented to the AMS, Chicago, 16 Apr 1927. Based on PhD dissertation.
1930a [Hofmann, L.] Plane transformations preserving centers of gravity. *Bull. Amer. Math. Soc.* 36:212–13 #173. Presented to the AMS, New York City, 22 Feb 1930.
1930b [Hofmann, L.] Plane transformations preserving centers of gravity, II. *Bull. Amer. Math. Soc.* 36:800 #401. Presented to the AMS, New York City, 25 Oct 1930.
1931a [Hofmann, L.] On a certain line locus associated with the lines of two distinct projectively related planes in euclidean space. *Bull. Amer. Math. Soc.* 37:817 #342. Presented by title to the AMS, New York City, 31 Oct 1931.
1931b [Hofmann, L.] On the double-point configurations of two projective planes on the same base as the result of the superposition of two distinct projectively related planes of euclidean space. *Bull. Amer. Math. Soc.* 37:815 #335. Presented to the AMS, New York City, 31 Oct 1931.

References to: AmMSc 5–8, 9P–11P; BioWMath.
"Lulu Bechtolsheim." (Obituary) *Redlands Daily Facts*, 30 Aug 1989.

Other sources: Owens questionnaire 1937; Smithsonian questionnaire 1985; communications with niece provided by Prof. J. Beery, Redlands University; University of Redlands Alumni Records Office; "Wilhelm Alfred Bechtolsheim," (Obituary) *Redlands Daily Facts*, 5 Nov 1968; Hermann Weyl, *The Open World: Three Lectures on the Metaphysical Implications of Science* (New Haven: Yale University Press, 1932); US census 1900 NY, SSDI.

Last modified: January 9,2016.

BEENKEN, May M. October 22, 1901–December 21, 1988.
University of California, Southern Branch (BEd 1923), University of Chicago (MA 1926, PhD 1928).

May Margaret Beenken was the daughter of Sophie (Kirn) (1862–1941), born in Pennsylvania, and Henry Beenken (b. 1852), born in Germany. She was born in Philadelphia, Pennsylvania, and had at least three older siblings: Daniel (ca. 1886–1954), a sister born in 1893, and Walter (1896–1959).

May Beenken attended public elementary school and three years of high school in Philadelphia before the family moved to southern California. After one year there she graduated from the Manual Arts High School of Los Angeles in 1919. She then was a member of the first class to receive bachelor's degrees at the Southern Branch of the University of California (now UCLA); she received a bachelor of education degree in 1923.

Beenken taught in the public schools of Los Angeles 1923–24 and was an associate in mathematics at the Southern Branch of the University of California 1924–25. She entered the University of Chicago in the summer of 1925 and was in residence there, except for summer quarter 1927, until June 1928, when she received her doctorate with a dissertation in projective differential geometry. She was a university fellow her last two years at Chicago and during that time served as chairman of the committee on arrangements and of the program committee of the Junior Mathematics Club.

After receiving her PhD in 1928, Beenken joined the faculty at Oshkosh Teachers College (now University of Wisconsin Oshkosh) as head of the mathematics department and remained in that position for nineteen years. She was joined in 1929 by Irene Price. In February 1931 Beenken organized the mathematics club at the college. She was in charge of mathematics for the US Air Force 96th column training detachment at the college 1943–44, and was director of the division of pre-professional education from 1944 until she left in 1947.

Beenken attended almost every meeting of the Wisconsin Section of the MAA from its first in April 1933 until she left the state in 1947; she served as secretary in 1934–35 and chairman in 1943–44. She was active in other state organizations as well; she was chairman in 1936–37 of the mathematics section of the Wisconsin Education Association and was a member in the late 1930s of a state committee on the uses and appreciation of mathematics.

Beenken was a lecturer at UCLA in the summer of 1945, and in 1947 returned to southern California as associate professor of mathematics and department chairman at Immaculate Heart College in Los Angeles; she was promoted to professor in 1951. During the summer of 1953 she attended an eight-week conference on collegiate mathematics in Boulder, Colorado, that was sponsored by the National Science Foundation. She received grants from the NSF for work at the University of Oregon in summer 1954 and at UCLA in summer 1959 and from the Social Science Research Council for work at Stanford in summer 1957. She retired from Immaculate Heart College as emeritus professor in 1969.

Beenken died at age eighty-seven in 1988 at St. Vincent Medical Center in Los Angeles. She was buried in Holy Cross Cemetery in Culver City, California. In the memorial note that appeared in the *Immaculate Heart College Alumni Newsletter* after her death, a former student and colleague recalled that "she was indeed a

superb instructor, always prepared down to the minutest detail and utterly meticulous in her comprehensive presentations" (p. 8). He added, "I remember once when over 80% of her graduating mathematics majors were above the 90th percentile in the nationwide Advanced Area Test in Mathematics – no students of Dr. Beenken's could ever say that they did not receive the best instruction that any educational institution could ever offer." And, finally, "Dr. Beenken was at all times a creative person, and when she retired from the College she decided to turn to painting. She applied herself here with the same single-mindedness as in teaching" (p. 10).

Organizational affiliations: AMS, MAA, NCTM, AAAS (fellow), AAUW, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1926 On the projective equivalence of plane curves. MA thesis, University of Chicago, directed by Ernest Preston Lane. Typescript.
1928 Surfaces in five-dimensional space. PhD dissertation, University of Chicago, directed by Ernest Preston Lane. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series.* 6:9–14.

Publications:
1933 Review of *Arithmetic for Teachers*, by H. E. Glazier. *Amer. Math. Monthly* 40:418.
1934 Improving the teaching of college mathematics. *Math. News Lett.* 8:97–103. Presented to the MAA, Beloit, WI, 8 Apr 1933; abstract: *Amer. Math. Monthly* 40:567 #1.
1956 with C. J. A. Halberg, Jr., R. B. Herrera, P. B. Johnson, P. A. White. College mathematics for non-science students. *Amer. Math. Monthly* 63:639–42. A report of the Special Committee on College Mathematics for Non-Science Students, a Subcommittee of the California Committee for the Study of Education, presented 20 Apr 1956.

Abstracts not listed above:
1929 Surfaces in five-dimensional space. *Bull. Amer. Math. Soc.* 35:457 #19. Presented to the AMS, Chicago, 29 Mar 1929. Based on PhD dissertation.
1939 Projective equivalents of the trigonometric functions. *Amer. Math. Monthly* 46:379 #2. Presented to the MAA, Milwaukee, 6 May 1939.
1954 Report on a conference for teachers of collegiate mathematics. *Amer. Math. Monthly* 61:447 #7. Presented to the MAA, Los Angeles, 13 Mar 1954

References to: AmMSc 5–8, 9P–11P; AmMWSc 12P–13P; AmWom 1935–40; WhoAmW 1–3.
Delaney, Matthew S. "In Memoriam: Dr. May M. Beenken." *Immaculate Heart College Alumni Newsletter*, Spring 1989.

Other sources: Master's thesis vita 1926; PhD dissertation vita 1928; Owens questionnaire 1937; communication with Immaculate Heart Community, Los Angeles; US Census 1900 PA, 1930 WI; California death certificate.

Last modified: March 6, 2009.

BENEDICT, Suzan R. November 29, 1873–April 8, 1942.
Smith College (BS 1895), Columbia University (Teachers College) (MA 1906), University of Michigan (PhD 1914).

Suzan Rose Benedict was the youngest of seven children of Harriett (or Harriott) Melvina (Deaver) (1835–1909), born in New York, and David DeForest Benedict (1833–1901) of Ohio. Her parents were married in 1856. All of the children were born in Ohio, presumably in or near Norwalk, where the family lived and where David D. Benedict practiced medicine. During the Civil War he had served as a surgeon for the Union army. In the 1880 census report the children were listed as Mary D., twenty-two; Hattie M., twenty; Agnes C., eighteen; Fannie B., sixteen; Frederick B., fourteen; Ellen E., eleven; and Susan R., six. In 1900 six were living of the seven born, and David D. Benedict had given up his medical practice and was described as a capitalist, apparently because he was looking after his land interests.

Suzan Benedict attended the high school in Norwalk, Ohio, before entering Smith College in the fall of 1891, where her major was chemistry and her minors were mathematics, German, and physics. After her graduation in 1895, she returned to Norwalk and taught mathematics there for the next decade. A note for her tenth reunion at Smith indicates that she is "a teacher of High School mathematics, a real estate agent, managing the affairs of a widowed mother, and a model aunt, endeavoring to show four sisters how to bring up children" (Box 1432: 1895, Benedict, Smith College Archives).

In the fall of 1905 Benedict entered Teachers College, Columbia University. Three of her courses, history of mathematics, history and teaching of mathematics, and a seminar course, were taken with David Eugene Smith, and she wrote her 1906 master's thesis under his direction. Her thesis concerned the development of algebraic symbolism from about 1500 to 1650 and was based in part on books that were in the private collections of David Eugene Smith and George Arthur Plimpton until these collections were donated to Columbia University in the 1930s. Benedict's work first appeared as a supplement to a report of the mathematics department of Teachers College, "Courses for the training of teachers of mathematics and other information relating to the Department: 1906–1907," and later as an article in *School Science and Mathematics*.

In January 1906 Benedict wrote to Smith College to inquire about a position. She was hired for the year 1906–07 as an assistant in mathematics for $800. In October 1906 she wrote to D. E. Smith "we are planning to give our girls in the mathematical club a little work on the teaching of secondary mathematics, and I find that my course last year is going to be most useful. In fact, in every way I am grateful for the work I was able to do there, and to you for making it possible" (D. E. Smith Professional Papers). Benedict joined Eleanor P. Cushing, Harriet R. Cobb, and Ruth G. Wood in the mathematics department at Smith. She was reappointed for 1907–08 as instructor for $900, then for a three-year term at $1,000, $1,100, and $1,200, per annum, and then for an indeterminate term. In April 1907 she wrote to D. E. Smith that "the girls are inspired to know more about the history of mathematics, and I really think that a one hour course for Juniors and Seniors may be introduced next year. I realize my boldness in trying to teach such a class, but I have decided that the only way to find out what one can do is to do it" (D. E. Smith Professional Papers).

In May 1911 Benedict wrote to D. E. Smith, "I am planning this summer to take a few courses in mathematics at the University of Michigan which is near my home, and am venturing to ask you to write to Professor Beman concerning the work that I did with you. I hope that he may admit me to his course in Differential Equations and to the other graduate courses to be given this summer" (D. E. Smith Professional Papers). She continued her work at Michigan in the summers of 1912 and 1913, and took a leave from Smith in 1913–14 to finish her course work in mathematics (real variables, infinite series, astronomy, complex variables, projective geometry, and harmonic analysis) and her dissertation in the history of mathematics with L. C. Karpinski. In several reviews of other works, Karpinski mentioned her 1914 dissertation.

Benedict returned to Smith in the fall of 1914 as associate professor, became professor in 1921, and was department chairman 1928–34. She was class dean, one of the first four appointed, 1918–26. She was on leave the first semester 1927–28 and the second semester 1940–41. It is probable that during her first leave she did the research for her 1929 article on Francesco Ghaligai, a sixteenth-century Florentine who wrote a popular introductory mathematics text. In her November 1928 correspondence with D. E. Smith about the article, Benedict credits him with teaching her to love the sixteenth-century books that she read whenever she could find the time and the books.

In the late 1930s Benedict described her chief interest as teaching. Although she had continued her research in the history of mathematics, Benedict wrote to Helen Owens in May 1940 that "it was not modesty that prevented my sending you a long list of published papers, but a scarcity of such papers. I have lost track of the very few I have written, as I have been much more interested in teaching and administration than in research" (Owens Papers).

Benedict was an Episcopalian and a member of the Daughters of the American Revolution. From at least 1918 she shared a home in Northampton with Susan M. Rambo. Rambo, who had graduated from Smith in 1905, returned as assistant in mathematics in 1908, received her PhD from Michigan in 1920, and was promoted through the ranks in the mathematics department until her retirement in 1948.

Benedict retired at sixty-eight as professor emeritus on February 1, 1942. She indicated in the February *Smith Alumnae Quarterly* that she had expected to go south but changed her plans when war was declared and would "stay at home to be near the Red Cross and other opportunities for service." She died suddenly of a heart attack at her home in Northampton, Massachusetts, in April and was buried in Norwalk, Ohio. She was survived by two sisters. In the minute read to the faculty after her death, it was noted that she had continued her research in the history of mathematics and "it is owing to her interest that the College library possesses a collection of rare books dealing with that field," and that "she was impatient with those who suggested that any branch of science was too difficult for girls to attempt" (Smith College Archives). The Suzan R. Benedict Prize, to be given to a member of the sophomore class who has done outstanding work in differential and integral calculus, was established by the college president, former members of the mathematics club, and others. Her home was bequeathed to Susan Rambo. Upon Rambo's death it was to go to Smith to be sold with the proceeds to be used for a scholarship fund. Rambo died in 1977.

Organizational affiliations: AMS, MAA (charter member), Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1906 The development of algebraic symbolism from Paciuolo to Newton. MA thesis, Columbia University, directed by David Eugene Smith. See also **1909**.
1914 A comparative study of the early treatises introducing into Europe the Hindu art of reckoning. PhD dissertation, University of Michigan, directed by Louis Charles Karpinski. Printed, 1916, Rumford Press, Concord, NH.

Publications:
1909 The development of algebraic symbolism from Paciuolo to Newton. *Sch. Sci. Math.* 9:375–84. Introductory note by D. E. Smith. Published version of MA thesis.
1929 The algebra of Francesco Ghaligai. *Amer. Math. Monthly* 36:275–78. Reviews: *JFM* 55.0010.08 (G. Feigl); *Rev. semestr. publ. math.* 35:9 (R. C. Archibald).

Abstract:
1923 The honor student in mathematics. *Amer. Math. Monthly* 30:409 #3. Presented to the MAA, Poughkeepsie, NY, 5 Sept 1923. Report on discussion of paper 409–10.

References to: AmMSc 3–7, BioWMath, DcNAA, WomWWA.
"Dr. Susan [*sic*] Benedict of Smith Is Dead." *New York Times*, 10 Apr 1942.

Other sources: Owens questionnaire 1937; Owens Papers; David Eugene Smith Professional Papers 1860–1945, Rare Book and Manuscript Library, Columbia University; Bentley Historical Library, University of Michigan; Smith College Archives; communication with University Library, University of Michigan; US Census 1870, 1880, 1900, 1910 OH, 1920, 1930 MA.

Last modified: July 19, 2009.

BERNSTEIN, Dorothy L. April 11, 1914–February 5, 1988.
University of Wisconsin (BA 1934, MA 1934), Brown University (PhD 1939).

Dorothy Lewis Bernstein was born in Chicago, Illinois, the eldest of four surviving daughters and one son of Tillie (Loyev, later Lewis) (1887–1969) and Jacob Louis Bernstein (1880–1956). Both parents were born in Russia and immigrated early in the century. Her father came to New York in 1902 and her mother to Milwaukee in 1907, at which time her mother's family assumed the name Lewis. Her parents were married in Milwaukee in 1912 and were naturalized in 1915. The first three children, Dorothy, Naomi (1915–1996), and Myrtle (1917–1992), were born in Chicago where her father had started a dairy business in 1911. In 1918 the family moved to a farm in Jackson, Wisconsin, about thirty miles northwest of Milwaukee. The next two children, Elinor (1919–1920) and Clarice (b. 1922), were born in Jackson. In 1924 the family moved again, this time to Milwaukee where, in 1925, her father started another dairy, and where their last child, Sheldon, was born in 1927. All of the surviving children earned advanced degrees, Myrtle (LeBow) an MD and all the others PhD's: Sheldon in 1952 (University of Wisconsin, biochemistry), Naomi (Golan) in 1969 (University of Chicago, social work), and Clarice (Yaffa Draznin) in 1985 (University of Southern California, history). In 1972 Yaffa Draznin published *It Began with Zade Usher: The History and Record of the Families Bernstein–Loyev/Lewis–Mazur*, for which Dorothy Bernstein wrote the foreword.

Bernstein attended public primary and secondary schools in Milwaukee and graduated from high school as valedictorian in 1930 at age sixteen. She then entered the University of Wisconsin, where she majored in mathematics. By October 1932, when she was just over eighteen, the department voted that she be permitted to follow a program of advanced independent study. During the next two years she worked with Mark H. Ingraham, Rudolf Langer, and Theodore Bennett and received her bachelor's and master's degrees in 1934 on the basis of a single examination and a thesis on finding the complex roots of polynomials by an extension of Newton's method. Her last year as an undergraduate she was a University scholar. She was first in a class of two thousand, and her bachelor's degree was awarded summa cum laude. After receiving her degrees, she remained at Wisconsin as a University fellow for the year 1934–35, doing further graduate work and teaching.

Bernstein continued her graduate studies at Brown University, where for two years, 1935–37, she held a scholarship and taught at Pembroke College, Brown's coordinate women's college. She completed her dissertation on the Laplace double integral and received her PhD from Brown in 1939. She was also an instructor at Mount Holyoke College from 1937 to 1940.

Bernstein reported a Milwaukee, Wisconsin, mailing address for the September 1940 AMS membership list. In 1941 she returned to the University of Wisconsin for a year as an instructor. In June 1942 she became a research associate to the statistician Jerzy Neyman working on theoretical problems in probability at the Statistical Laboratory of the University of California, Berkeley, where she also taught a graduate course in probability theory in the mathematics department. In her 1978 contribution to an AWM panel, published in 1979, she notes that she left after only eight months because "Neyman and I did not see eye-to-eye on what was the mathematical justification of a statistical procedure" (p. 10). Erich L. Lehmann, a graduate student at Berkeley at the time, later quoted Neyman as saying that

"Dorothy Bernstein ... has just come to me and said she doesn't like the kind of stuff that we do because it's not really nice mathematics. She wants to leave" (DeGroot 1986, 244). Bernstein was unemployed for several months, but in fall 1943 she moved to the University of Rochester as an instructor. In 1946 she was promoted to assistant professor, in 1951 to associate professor, and in 1957 to professor. She spent three years as acting chairman of the department. She also directed three PhD dissertations, including that of her later collaborator and close friend, Geraldine Coon, in 1950. Her other two doctoral students were John M. Perry, 1960, and David M. Burton, 1961.

While at Rochester she was asked by C. B. Tompkins, who was working at Engineering Research Associates on a contract from the Office of Naval Research, to undertake a study of the current state of knowledge of existence theorems in partial differential equations. As she explained in her 1978 AWM talk, "some of the proofs could be used as basis for the computational solutions of non-linear problems that were just being tackled by high-speed digital computers." Her 1950 book with Princeton University Press was the result of this undertaking. She spent the year 1950–51 as a member of the Institute for Advanced Study and the year 1957–58 as a visiting professor at the Institute for Numerical Analysis of the University of California, Los Angeles. During the 1950s she wrote more than fifty reviews for *Mathematical Reviews*.

In 1959 Bernstein went to Goucher College as professor and remained there until she retired in 1979 as professor emeritus. She was chairman of the department from 1960 until 1970 and director of the computer center from 1962 until 1967. She spent the year 1966–67 as visiting professor of applied mathematics at Brown. She returned to Brown in the fall of 1973 and spent the spring of 1974 at the University of Tennessee. While at Goucher, Bernstein became very active in the uses of the computer in education and in the spring of 1971 was part of a group that founded the Maryland Association for the Educational Uses of Computers. She was instrumental in obtaining funds for computers at Goucher and helped run an NSF summer institute in computer-based mathematics for high school teachers. At her retirement Goucher presented her with an award for distinguished service to the college. In 1981 Towson State University awarded her an honorary Doctor of Humane Letters (LHD). She was a fellow of the AAAS.

In 1985 Bernstein received a Certificate for Meritorious Service from the Maryland-District of Columbia-Virginia Section of the MAA, having served the section as governor 1965–68 and the national MAA in many capacities. She served on and chaired various committees and was a member of the editorial board of the *Two-Year College Mathematics Journal*. At the national level she was first vice president 1972–73 and president 1978–80, the first woman in this role in the MAA's history. From the early 1970s through the early 1980s Bernstein was often an invited speaker at sectional meetings of the MAA. In addition to her work with the MAA, she served on advisory panels of other national associations and for the National Science Foundation.

At the time of her retirement from Goucher College in 1979, a pair of articles appeared in the *Goucher Quarterly*, "Bernstein on Coon" and "Coon on Bernstein." Geraldine Coon, Bernstein's 1950 doctoral student, came to Goucher in 1964 and retired the same year as Bernstein. After giving a detailed description of Bernstein's mathematical activities and work at Goucher, Coon added that in addition to her

duties as president of the MAA, "whenever possible, she indulges in her favorite hobbies of gardening, canning, and freezing. She intends to maintain the famous Bernstein Box at the Preakness, where annually the laws of probability and statistics fall into complete disarray" (17). Coon remained at Goucher an additional year before she returned to her home on the Pawcatuck River in Connecticut. Bernstein and Coon shared the home until Bernstein's death.

For several years after her retirement Dorothy L. Bernstein maintained an affiliation with Brown University, which was about forty-five miles from her Connecticut home. She died at the Rhode Island Hospital in Providence in February 1988 at the age of seventy-three. She was survived by her three sisters, Dr. Naomi Golan and Dr. Myrtle LeBow, both of Israel, and Dr. Yaffa Draznin of Los Angeles; and by her brother, Dr. Sheldon Bernstein of Milwaukee. She was buried in Milwaukee.

Organizational affiliations: AMS, MAA, SIAM, AAAS, AAUP, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1934 Some problems in the approximation of the roots of polynomials. MA thesis, University of Wisconsin. Typescript.

1939 The double Laplace integral. PhD dissertation, Brown University, directed by Jacob David Tamarkin. Typescript. Printed version, 1941, reprinted from *Duke Math. J.* 8:460–96.

Publications:

1941 The double Laplace integral. *Duke Math. J.* 8:460–96. Based in part on PhD dissertation. Reviews: *JFM* 67.0386.03 (G. Doetsch); *MR* 3,38e (R. P. Boas, Jr.).

1950 *Existence Theorems in Partial Differential Equations.* Annals of Mathematical Studies, no. 23. Princeton: Princeton University Press. Reviews: *Bull. Amer. Math. Soc.* 57:323–25 (F. John); *MR* 12,262c (M. Janet) (this review also appears as *Zbl* 066.07601). Reprint: 1965. New York: Kraus Reprint Corp.

1953 with G. A. Coon. Some properties of the double Laplace transformation. *Trans. Amer. Math. Soc.* 74:135–76. Reviews: *MR* 14,639b (W. Saxer); *Zbl* 087.31002 (A. Zitarosa).

1961 Review of *Einfuhrung in Theorie und Anwendung der Laplace-Transformation*, by G. Doetsch. *Math. Comp.* 15:100.

1963 with G. A. Coon. Some general formulas for double Laplace transformations. *Proc. Amer. Math. Soc.* 14:52–59. Reviews: *MR* 26 #558 (T. E. Hull); *Zbl* 112.33603 (G. Doetsch).

1965 with G. A. Coon. On the zeros of a class of exponential polynomials. *J. Math. Anal. Appl.* 11:205–12. Reviews: *MR* 32 #1327 (M. Marden); *Zbl* 136.37302 (M. Kuczma).

1972 Foreword. In *It Began with Zade Usher: The History and Record of the Families Bernstein—Loyev/Lewis—Mazur* by Y. Draznin, vii–viii. Los Angeles: JAMY Publications.

1979a Bernstein on Coon. *Goucher Quart.* 58 (1): 18–20.

1979b The role of applications in pure mathematics. *Amer. Math. Monthly* 86:245–53. Reviews: *MR* 80d:00031 (Editors); *Zbl* 415.00030 (Author's abstract). Presented by invitation at meetings of the MAA, Clemson, SC, 31 Mar–1 Apr 1978, and Cedar Falls, IA, 21–22 Apr 1978.

1979c with M. G. Humphreys, A. F. O'Neill, and M. Rees. Women mathematicians before 1950. *AWM Newsletter* 9 (4): 9–18. Transcription of a panel discussion sponsored by the AWM, Providence, RI, 9 Aug 1978, ed. P. Kenschaft. Reprint of pages 9–11, with editorial revisions: 2005. The real world of the 1930s. In *Complexities*, eds. B. A. Case and A. M. Leggett, 204–05. Princeton, NJ: Princeton University Press.

Abstracts:
1942 with S. M. Ulam. On the problem of completely additive measure in classes of sets with a general equivalence relation. *Bull. Amer. Math. Soc.* 48:361–62 #169. Presented by Bernstein to the AMS, Chicago, 17 Apr 1942.
1952 Functions of subdivisions and their use in advanced undergraduate mathematics. *Amer. Math. Monthly* 59:589 #6. Presented to the MAA, Geneva, NY, 10 May 1952.

Presentations not listed above:
Application of the Laplace transform to partial differential equations. Presented to a meeting of SIAM, Baltimore, MD, May 1960.
How to make and break codes – cryptanalysis and mathematics. Presented by invitation to the MAA, Butler, PA, 5 May 1973.
How to make and break codes. Presented by invitation to meetings of the MAA, Little Rock, AR, 5 Apr 1974; Austin, TX, 6 Apr 1974; and Vermillion, SD, 19–20 Apr 1974.
A differential equation of literary criticism. Presented by invitation to meetings of the MAA, DeKalb, IL, 27 Apr 1979, and Boulder, CO, 28–29 Mar 1980.
Preparation for careers in applied mathematics. Presented by invitation to a meeting of the MAA and Kansas Association of Teachers of Mathematics, Manhattan, KS, 11–12 Apr 1980.
Mathematical modeling and existence theorems. Presented by invitation to meetings of the MAA, Wooster, OH, 26–27 Oct 1979; Ruston, LA, 15–16 Feb 1980; Monterey, CA, 23 Feb 1980; Jacksonville, FL 7–8 Mar 1980; Manhattan, KS, 11–12 Apr 1980; Crete, NE, 18–19 Apr 1980; Fulton, MO, 25–26 Apr 1980; New York City, 2 May 1981; and Trenton, NJ, 24 Oct 1981.
Who is the MAA? Presented by invitation to a meeting of the MAA, Ruston, LA, 15–16 Feb 1980.
A small college's experience with applications in the mathematics curriculum. Presented by invitation to a meeting of the MAA, Crete, NE, 18–19 Apr 1980.
The biography of a theorem. Presented by invitation to a meeting of the MAA, Hartford, CT, 20–21 Apr 1981.
Mathematical expectation. Retiring presidential address presented to a meeting of the MAA, Cincinnati, OH, 14–17 Jan 1982.

References to: AmMSc 7–8, 9P–11P; AmMWSc 12P–13P, 14–18; AmWomTe; BioWMath; EncWB 2; NotMat; NotSci 2; NotTwCS 1; Sc&ItsT 7; WhoAm 38; WhoAmW 3–8; WhoWorJ 1972, 1978.
Coon, Geraldine A. "Coon on Bernstein." *Goucher Quart.* 58, no. 1 (1979): 16–17.
Moskol, Ann. "Dorothy Lewis Bernstein (1914–)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 17–20. Westport, CT: Greenwood Press, 1987.
Boas, R. P. "Dorothy L. Bernstein, 1914–1988." *Focus* 8, no. 4 (1988): 5.
"Dorothy Bernstein." (Obituary) *Westerly* (*RI*) *Sun*, 14 Feb 1988.
"Dorothy L. Bernstein: 1914–1988." *Notices Amer. Math. Soc.* 35 (1988): 543.

Related manuscript materials:
Dorothy Lewis Bernstein, President. Headquarters Records. Mathematical Association of America Records, 1916–present, Archives of American Mathematics, Center for American History, University of Texas at Austin.

Other sources: University of Wisconsin Archives; communication with Westerly, RI, Public Library; Yaffa Draznin, *It Began with Zade Usher* (Los Angeles: JAMY Publications, 1972); Morris H. DeGroot, "A Conversation with Erich L. Lehmann," *Statistical Sci.* 1 (1986): 243–58; Cockey, "Mathematics at Goucher"; US Census 1920, 1930 WI; SSDI.

Last modified: December 21, 2010.

BLACK, Florence. November 22, 1889–September 13, 1974.
University of Kansas (BA 1913, MA 1921, PhD 1926).

Florence Lucile Black was born in Meade County, Kansas, the fourth of five children of Mary Ella (Winslow) (b. 1852) and Moses Black (b. 1845), both natives of Illinois. Moses Black was a land surveyor and rancher. The children were Zada (b. 1878), Ernest (1882–1949), and Ethel (b. 1884), all born in Illinois, and Florence and Frances (b. 1891), born in Kansas. Her brother, Ernest Bateman Black, became a well-known consulting engineer in Kansas City who in 1942 was president of the American Society of Civil Engineers.

Florence Black grew up on a cattle ranch in southwestern Kansas. She described her earliest years in "Life on the Cattle Range in the Early Days of Western Kansas, or Moses Moves to Kansas," which is included in G. Baley Price's history of the Kansas mathematics department (Appendix VII, 736–45). When she was very young she lived in a large one-room sod house. Her earliest school consisted of her father or sister Zada as teacher, and four students: the two youngest Black girls and two neighbor children, all four of whom later graduated from the University of Kansas.

Black attended the University of Kansas in Lawrence and graduated in 1913. After her graduation, she taught for two years at the high school in Anthony, Kansas, and for three years at a high school in Wichita. In 1918 she returned to the university as instructor in mathematics and remained on the faculty until her retirement. Initially she also took graduate courses and received her master's degree in 1921 and her PhD with a minor in physics in 1926, the same year that Wealthy Babcock earned her doctorate at Kansas.

Having earned her PhD, Black was promoted to assistant professor in 1926. As was the case with her colleague and friend Wealthy Babcock, she was promoted to associate professor in 1940. She retired as associate professor emeritus in 1960.

Price notes in his department history that "many will remember Professor Black best as an outstanding teacher. . . " (p. 747). Upon her retirement the Florence Black Excellence in Teaching Award was established to provide a gift to the best teacher among the mathematics department's first-year assistant instructors. The university also awards a Florence Black scholarship, and, in its 2005 annual report, the College of Liberal Arts and Sciences announced the establishment of the Florence Black and Wealthy Babcock Professorship in Mathematics. Black's other contributions to the University of Kansas included her serving as a member of the university's committee on scholarships for twenty years, as secretary of the college faculty for nineteen years, as faculty advisor of the women's pep club from its founding until 1952, and as treasurer of the Women's Faculty Club and of the University of Kansas chapter of Sigma Xi. She was also a faithful attendee at meetings of the Kansas Section of the MAA.

A paper read by Price at her memorial service noted her many extracurricular interests: horseback riding, camping, swimming, tennis, and traveling. He said, "In a recent letter former chancellor Deane W. Malott, now president emeritus of Cornell University, wrote as follows: 'I remember once offering her camping rights in the center of the Cornell campus, should she and Wealthy desire to come' " (Price 1976, 747). She and Wealthy Babcock were known, too, for their extraordinary attendance at football and basketball games at the University of Kansas. She was

remembered twenty-five years after her death "as a dedicated Jayhawk sports fan" in the *Lawrence Journal-World*.

Among her travels were two trips to Alaska. At age eighty she made a trip to the Mediterranean, Tanzania, Uganda, and Kenya. In 1973 Black was elected to the Faculty Women Hall of Fame by the Commission on the Status of Women.

Florence Black died in Lawrence, Kansas, at age eighty-four in 1974. She was cremated and her ashes were buried in the Pioneer Cemetery on the University of Kansas campus.

Organizational affiliations: AMS, Sigma Xi.

Thesis and dissertation:
1921 Methods of generating plane cubic curves. MA thesis, University of Kansas.
1926 A reduced system of differential equations for the invariants of ternary forms. PhD dissertation, University of Kansas, directed by Ellis Bagley Stouffer. Printed version, 1929, reprinted from *Univ. Kansas Sci. Bull.* 19, no. 2: 17–25.

Publication:
1929 A reduced system of differential equations for the invariants of ternary forms. *Univ. Kansas Sci. Bull.* 19, no. 2: 17–25. Published version of PhD dissertation. Presented to the AMS, St. Louis, MO, 26 Nov 1927; abstract: *Bull. Amer. Math. Soc.* 34:19 #3.

Abstract not listed above:
1944 A correspondence refresher course for mathematics teachers. *Amer. Math. Monthly* 51:181 #1. Presented to the MAA, Lawrence, KS, 10 Apr 1943.

References to: BiDWSci.
Gray, Mary. "In Memoriam: Florence Black." *AWM Newsletter* 5 (Jan 1975): 4.
"Sept 15 – 25 Years Ago." *Lawrence Journal-World*, 15 Sep 1999.

Other sources: NatCAB 37 (Black, Ernest Bateman); Price, *History of the Department of Mathematics of the University of Kansas*; US Census 1900, 1910, 1920 KS.

Last modified: August 21, 2010.

BLANCH, Gertrude. February 2, 1897–January 1, 1996.
New York University (BS 1932), Cornell University (MS 1934, PhD 1935).

Gertrude Blanch was born Gittel Kaimowitz in Kolno, Poland, which was then under the control of Russia. She was the last of seven children of Dora (Blanc) and Wolfe Kaimowitz (also "Kamovitz" and "Kamowitz"). Her father had emigrated from Poland to the United States early in the century, and he was joined by his wife, Gittel, and another daughter in 1907. Gittel attended public elementary and secondary school in Brooklyn, New York, and graduated from the Eastern District High School at the beginning of 1914, the year her father died. By this time she had Americanized her first name to Gertrude. In order to support her mother she took a clerical job.

Gertrude Kaimowitz became a naturalized US citizen in 1921. After her mother died in 1927, she decided to resume her education, so she enrolled in the Washington Square College of New York University that year and began taking night courses. She also decided to leave her job working for a hat dealer in increasingly responsible positions. However, her employer, Jacob Marks, offered to pay her tuition if she would remain at the job; she accepted the offer and graduated summa cum laude with a major in mathematics and a minor in physics in 1932. Also in 1932, in February, she legally changed her name to Gertrude Blanch, an Americanization of her mother's name Blanc. Later in 1932 she used the name Gertrude K. Blanch.

When Blanch applied to graduate school at Cornell University, she used as one of her references Fay Farnum, who had earned her PhD in 1926 from Cornell as a student of Virgil Snyder and who had joined the faculty at New York University just before Blanch enrolled there. Blanch entered Cornell in September 1932 and received her master's degree in February 1934. She held a graduate scholarship her final year at Cornell and earned her PhD in 1935 after writing a dissertation in geometry and with minors algebra and analysis.

After receiving her PhD, Blanch returned to New York City and spent a year as a tutor at Hunter College replacing a faculty member on leave. She then took a job as a bookkeeper in Manhattan and, in order to remain mathematically active, took an evening course in relativity at Brooklyn College. The instructor of the course was Arnold N. Lowan. When Lowan learned that she had a doctorate in mathematics he invited her to join the WPA project that he had been asked to head. Although Blanch had no training in numerical analysis she had experience as an office manager and with office calculating machines. Thus, it was appropriate that she was hired to supervise the training of high school graduates to make sophisticated mathematical tables using only pencil and paper. At the beginning of 1938, Blanch became a mathematician for the Mathematical Tables Project in New York. In a 1973 interview her colleague Ida Rhodes described Blanch's method of writing detailed work sheets that could be followed one step at a time by people who had no mathematical training. She claimed that Blanch "did accomplish miracles. There is no doubt about that. It wasn't just the question of teaching those people, who never heard [that numbers have signs, how to compute.] That was an important thing, but not her most important [deed.] The [crowning accomplishment] was the raising of the morale of these people who had [felt] rejected by society and [thought] they were useless" (Tropp interview, 2, square brackets in the original).

Blanch worked for the project until 1942, spending the last two years as a tutor in the evening session of Brooklyn College. In 1942 she, along with many of the professional staff of the Mathematical Tables Project, became employees of the National Bureau of Standards (NBS) contracted to the Applied Mathematics Panel of the National Defense Research Committee. During this period Blanch applied for and was denied security clearance based mainly on the fact that her sister, in whose apartment she lived, was a member of the Communist Party. In 1946 Blanch was invited to join the staff at Los Alamos but was again denied a security clearance and remained with the Mathematical Tables Project. The group continued working in New York and was disbanded after the war. In 1948 Blanch went to California, still as an employee of NBS, as assistant director for computing at the Institute for Numerical Analysis (INA) located on the campus of UCLA. During the McCarthy era, she was again investigated, this time by a loyalty board of the Department of Commerce, which oversaw the NBS. David Alan Grier reports in his 2005 book that a May 1952 "hearing resolved the charges against Blanch and allowed her to return to her job" (308–09). With her loyalty no longer questioned, the following year she served as a US representative to a symposium on automated digital computing held at the British National Physics Laboratory.

Although Blanch was cleared of disloyalty, other employees of the INA remained under attack, and the Institute closed in June 1954. Blanch left at the end of 1953 and worked for the Electrodata Corporation, a section of the Consolidated Engineering Company in Pasadena, which was soon to be bought by the Burroughs Corporation. At the end of 1954 she became a senior mathematician at the Aerospace Research Laboratories at the Wright Air Development Center (later Division) of Wright-Patterson Air Force Base in Dayton, Ohio. At this time she was granted security clearance.

Blanch remained at Wright-Patterson until her retirement in 1967. She later said, "I was never as happy in any other place as I was at Wright Field. I had complete freedom to do exactly what I wanted the way I wanted to do it and, I think, my best work was done there" (Tropp interview 1973). The Air Force recognized her accomplishments by awarding Blanch a Special Service Certificate in 1963 and a Senior Citizen Award the following year. Also during this period she continued her work on Mathieu functions and published extensively in this area, including the contribution on the subject to the 1964 NBS-sponsored *Handbook of Mathematical Functions*. At the base she taught mathematics to officers needing training in aerodynamics. She was active in the Dayton branch of the AAUW and was higher education chairman in at least 1963.

Starting in the 1940s, Blanch made significant contributions to many volumes of tables that do not bear her name as an author but were brought out by the WPA Mathematical Tables Project and later by the National Bureau of Standards computation laboratory. While she was at INA and Wright AFB Blanch supervised the computations for many projects that resulted in publications or technical reports in which her assistance was acknowledged. In addition, she contributed to research in other ways by reviewing and assisting editors. Soon after the National Research Council journal *Mathematical Tables and Other Aids to Computation* was begun in 1946, Blanch began contributing reviews to the section RMT (Recent Mathematical Tables). In 1955 the section became known as "Reviews and Descriptions of Tables and Books," and Blanch continued to contribute reviews, as she did when

the journal changed its name to *Mathematics of Computation* in 1960. In the 1960s she started contributing to the *Mathematical Reviews*; her forty-second and last review appeared in 1987. In addition to refereeing for various journals, Blanch also served as organizational representative from Wright Air Development Center to the *SIAM Review* during its first five years, 1959–63.

On March 3, 1964, Blanch received the Federal Woman's Award. The following year, when the women's movement of the 1960s was just beginning, she noted in an article for the student journal of the NCTM that "frequently letters come to my desk asking whether there is a place in mathematics for women," while others ask if they can "hope to attain recognition, eventually" (**1965**, 1). She answered by sketching the careers of Sonya Kovalevsky and Emmy Noether and ended her article:

> Acceptance of minority groups—women or other groupings—comes when there is need for the service this group can render. The following excerpt from Sonya Kovalevsky . . . is worth quoting: "I received . . . an article by Strindberg, in which he proves, as decidedly as two and two make four, what a monstrosity is a woman who is professor of mathematics, and how unnecessary, injurious, and out of place she is. I think he is right *au fond;* only I wish he would prove clearly that there were plenty of mathematicians in Sweden better than I am and that it was only *galanterie* which made them select me!"
>
> Even today, the man would probably be preferred by most employers over an equally competent woman. However, the prospects ahead are for many more positions than there are applicants to fill them. In such a climate, there can be no effectual discrimination. There is no essential handicap to a career by a women; we look forward to a crop of women scientists, to perhaps disprove Strindberg's judgment of them. (**1965**, 4)

At her retirement in 1967 the Aerospace Research Laboratories published the *Blanch Anniversary Volume: A Series of Papers Presented on the Occasion of her Retirement by the Friends of Gertrude Blanch.* One of her closest colleagues, Ida Rhodes, commenting on Blanch's receiving the Federal Woman's Award, said that "if I had anything to do with awarding medals, I would have given her [one] made all of diamonds for the early work that she did, in welding a malnourished, dispirited crew of people, coming from [the] Welfare Rolls, [into] a group that Leslie J. Comrie said was the 'mightiest computing team the world had ever seen' " (Tropp interview with Ida Rhodes 1973, 2, square brackets in the original).

Even in retirement Blanch continued her involvement with mathematics beyond writing reviews. Until 1970 she was an Air Force consultant through a contract with Ohio State University. She then returned to California where, in 1973, she was writing a book on numerical analysis for people who had computational experience but did not understand the numerical processes involved. At that time she expected it to take her five years to finish it. The unpublished manuscript is in her papers at the Charles Babbage Institute.

Gertrude Blanch died in San Diego on New Year's Day 1996, a month before her ninety-ninth birthday.

Organizational affiliations: AMS, MAA, SIAM, AAAS (fellow), Phi Beta Kappa, AAUW.

Thesis and dissertation:

1934 Number of representations by certain positive ternary quadratic forms. MS thesis, Cornell University. Typescript.

1935 Properties of the Veneroni transformation in S_4. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed abstract, 1935, reprinted from *Amer. J. Math.* 58:639–45.

Publications:

1936 Properties of the Veneroni transformation in S_4. *Amer. J. Math.* 58:639–45. Abstract of PhD dissertation. Reviews: *JFM* 62.0752.03 (E. A. Weiss); *Zbl* 014.22801 (E. G. Togliatti).

1937 The Veneroni transformation in S_n. *Amer. J. Math.* 59:783–86. Reviews: *JFM* 63.0606.04 (E. A. Weiss); *Zbl* 017.27901 (E. G. Togliatti).

1940a Review of *The Mathematics of Business*, by H. E. Stelson. *Amer. Math. Monthly* 47:649–50.

1940b with A. N. Lowan. Tables of Planck's radiation and photon functions. *J. Opt. Soc. Amer.* 30:70–81. Review: *MR* 1,252h (L. M. Milne-Thomson).

1941a Review of *Mathematics of Accounting and Finance*, Parts I and II, by C. H. Langer and T. B. Gill. *Amer. Math. Monthly* 48:144–45.

1941b with A. N. Lowan. Errors in Hayashi's table of Bessel functions for complex arguments. *Bull. Amer. Math. Soc.* 47:291–93. Reviews: *JFM* 67.0433.02 (O. Volk); *Zbl* 025.06701 (R. Gran Olsson). Also appeared as report of the Mathematical Tables Project, O.P. 65-2-97-33. New York: Works Progress Administration, 1940.

1942a with A. N. Lowan, R. E. Marshak, and H. A. Bethe. The internal temperature-density distribution of the sun. *Astrophys. J.* 94:37–45.

1942b with W. Horenstein and A. N. Lowan. On the inversion of the q-series associated with Jacobian elliptic functions. *Bull. Amer. Math. Soc.* 48:737–38. Reviews: *MR* 4,90e (M. A. Basoco); *Zbl* 061.16004 (G. Lochs). Presented by title as "Inversion of the q-series associated with Jacobi elliptic functions" to the AMS, New York City, 28 Feb 1942; abstract: *Bull. Amer. Math. Soc.* 48:213 #114.

1943a with I. Rhodes. Seven-point Lagrangian integration formulas. *J. Math. Phys. M.I.T.* 22:204–07. Reviews: *MR* 5,159f (W. E. Milne); *Zbl* 061.28209 (H. Wundt). Reissue: 1949 as MT25. Washington, DC: National Bureau of Standards.

1943b with M. Abramowitz and A. N. Lowan. Table of $Ji_0(x) = \int_x^\infty \frac{J_0(t)}{t}\,dt$ and related functions. *J. Math. Phys. M.I.T.* 22:51–57. Reviews: *MR* 5,49a (M. C. Gray); *MTAC* 1:155–56 (H. Bateman); *Zbl* 061.30401 (H. Wundt). Reissue: 1949 as MT21. Washington, DC: National Bureau of Standards. Reprint: 1954. In *Tables of Functions and Zeros of Functions: Collected Short Tables of the National Bureau of Standards Computation Laboratory*, US Department of Commerce, NBS Appl. Math. Ser. 37, 33–39.

1946a On the computation of Mathieu functions. *J. Math. Phys. M.I.T.* 25:1–20. Reviews: *MR* 8,53c (L. J. Comrie); *MTAC* 2:171–72 (W. G. Bickley); *Zbl* 061.27702 (F. W. Schäfke). Reissue: 1950 as MT37. Washington, DC: US Department of Commerce, National Bureau of Standards.

1946b with R. E. Marshak. The internal temperature-density distribution of main sequence stars built on the point-convective model. II Sirius A. *Astrophys. J.* 104:82-86.

1947 Note on C. J. Bouwkamp's paper "On spheroidal wave functions of order zero." *J. Math. Phys. M.I.T.* 26:93.

1950a Differencing on the Type 405 Accounting Machine. In *Proceedings of the Scientific Computation Forum, 1948*, ed. H. R. J. Grosch, 14–22. New York: International Business Machines. Review of volume: *MTAC* 7:51–52 (F. L. Alt). Presented to the IBM Forum, 1948.

1950b Review of *Tables of Generalized Sine- and Cosine-integral Functions*, Parts I and II. *Bull. Amer. Math. Soc.* 56:196–97.

1950c with R. Siegel. Table of modified Bernoulli polynomials. *J. Res. N.B.S.* 44:103–07. Reviews: *MR* 12,207e (J. C. P. Miller); *MTAC* 5:15 (D. H. Lehmer).
1951 Introduction. In *Tables Relating to Mathieu Functions: Characteristic Values, Coefficients, and Joining Factors*, National Bureau of Standards Computation Laboratory, xiii–xliii. New York: Columbia University Press. Review of book: *Bull. Amer. Math. Soc.* 58:85–88 (C. J. Bouwkamp). Reprint of book: 1967. NBS Appl. Math. Ser. 59. Washington, DC: National Bureau of Standards. Review of reprint of book: *Math. Comp.* 22:466 (J. W. W.).
1951–53 with E. C. Yowell. A guide to tables on punched cards. *Math. Tables Other Aids Comput.* 5:185–212. Addenda 6:204–05; 7:1–6. Reviews: *Zbl* 044.33204 (Fr. A. Willers) and 050.13401 (second addendum) (Fr. A. Willers).
1952a On the numerical solution of equations involving differential operators with constant coefficients. *Math. Tables Other Aids Comput.* 6:219–23. Reviews: *MR* 14,413g (W. E. Milne); *Zbl* 047.36502 (K. Borkmann).
1952b Zeros of $I_{n+1}(x)J_n(x)+J_{n+1}(x)I_n(x)$. *Math. Tables Other Aids Comput.* 6:58–59.
1953a On the numerical solution of parabolic partial differential equations. *J. Res. N.B.S.* 50:343–56. Reviews: *MR* 15,474b (H. Polachek); *Zbl* 051.35103 (H. Witting).
1953b with H. E. Fettis. Subsonic oscillatory aerodynamic coefficients computed by the method of Reissner and Haskind. *J. Aeronaut. Sci.* 20:851–53.
1954 On modified divided differences. Pts. I and II. *Math. Tables Other Aids Comput.* 8:1–11, 67–75. Reviews: *MR* 15,560e (pt. I) and 15,900d (pt. II) (A. S. Householder); *Zbl* 055.11504 (pt. I) and 055.11505 (pt. II) (Fr. A. Willers).
1955 with I. Rhodes. Tables of characteristic values of Mathieu's equation for large values of the parameter. *J. Washington Acad. Sci.* 45:166–96. Reviews: *MR* 17,92b (L. Fox); *MTAC* 10:108 (A. Erdélyi). Reprint: 1967. Appendix in: Tables relating to Mathieu functions: Characteristic values, coefficients, and joining factors. NBS Appl. Math. Ser. 59. Washington, DC: National Bureau of Standards. Review of reprint of book: *Math. Comp.* 22:466 (J. W. W.).
1958 Review of *The Bivariate Normal Probability Distribution*, by D. B. Owens. *J. Amer. Statist. Assoc.* 53:218–19.
1959 with H. Ferguson. Remarks on Chandrasekhar's results relating to Heisenberg's theory of turbulence. *Phys. Fluids* 2:79–84. Review: *Zbl* 088.42703 (J. Bass).
1960 The asymptotic expansions for the odd periodic Mathieu function. *Trans. Amer. Math. Soc.* 97:357–66. Reviews: *MR* 22 #8145 (J. Meixner); *Zbl* 103.29404 (F. W. Schäfke).
1964 Numerical evaluation of continued fractions. *SIAM Rev.* 6:383–421. Reviews: *MR* 30 #1605 (E. Frank); *Zbl* 133.38904 (W. Börsch-Supan).
1965 Women in mathematics. *Math. Student J.* 12 (4): 1–4.
1966a Numerical aspects of Mathieu eigenvalues. *Rend. Circ. Mat. Palermo* 2nd ser., 15:51–97. Reviews: *MR* 37 #4951 (J. Meixner); *Zbl* 196.49901 (L. Collatz).
1966b Review of *Étude sur les représentations approchées des solutions de l'équation de Mathieu*, by F. Michaud. *Math. Comp.* 20:339.
1967 Review of *Approximate Calculation of Integrals*, by V. I. Krylov. *Scripta Math.* 28:83–4.
1969 with D. S. Clemm. The double points of Mathieu's differential equation. *Math. Comp.* 23:97–108. Reviews: *MR* 39 #1084 (Authors' summary); *Zbl* 176.38702 (Authors' summary).
1972 Mathieu functions. In *Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables*, ed. M. Abramowitz and I. A. Stegun, 721–50. New York: Dover Publications. Reprint of NBS Appl. Math. Ser. 55. Washington, DC: National Bureau of Standards, 1964. Review of original NBS report: *Math. Comp.* 19:147–49 (J. W. W.).
1974 with I. Rhodes. Table-making at the National Bureau of Standards. In *Studies in Numerical Analysis: Papers in Honor of Cornelius Lanczos on the Occasion of his 80th*

Birthday, ed. B. K. P. Scaife, 1–6. Dublin: Royal Irish Academy and London: Academic Press. Review: *MR* 50 #1461 (Editors).

Selected technical reports:

1939 with M. Abramowitz, W. Kaufman, F. G. King, A. N. Lowan, and M. Pfeferman. Tables of the exponential function e^x. New York: Work Projects Administration. Official Project no. 765-97-3-10. Reviews: *Amer. Math. Monthly* 48:56–57 (J. H. Curtiss); *Math. Gaz.* 33:70–72 (J. C. P. Miller); *MTAC* 1:438 #215 (E. Fix). Errata: *MTAC* 1:161 #25, 1:198 #39, 2:314 #109, and 4:100 #170. Later editions Washington, DC: US Government Printing Office. Second ed. 1947, MT2. Reviews: *Math. Gaz.* 33:70–72 (J. C. P. Miller); *MTAC* 3:173 #524 (R. C. Archibald). Errata: *MTAC* 4:100 #170. Third ed. 1951, Appl. Math. Ser. 14. Reviews: *Biometrika* 40:477–78; *Math. Gaz.* 37:136 (T. A. A. Broadbent). Fourth ed. 1961, Appl. Math. Ser. 14.

1946 An asymptotic expansion for $E_n(x)=\int_1^\infty \left(e^{-xu}/u^n\right)du$. Appendix A in *The Functions* $E_n(x)=\int_1^\infty e^{-xu}u^{-n}du$ by G. Placzek, 8. Clark River, Ontario: National Research Council of Canada, Division of Atomic Energy. Report no. MT-1. Originally appeared July–Aug 1946. Corrected edition appeared 2 Dec 1946. Reviews: *MR* 9,159f (J. G. van der Corput). *MTAC* 2:272 (Extracts from introductory text; editorial notes). Reprint: 1954. In *Tables of Functions and Zeros of Functions: Collected Short Tables of the National Bureau of Standards Computation Laboratory*, NBS Appl. Math. Ser. 37, 61. Reprint: 1959. Table I in *Tables of the Exponential Integral Function* $E_\nu(x)=\int_1^\infty \left(e^{-xu}u^{-\nu}\right)du$ by Vera I. Pagurova, 3–52. Moscow: Akad. Nauk SSSR. Review: *Math. Comp.* 19:147–49 (A. F.).

1952 (Editor) Fundamental problems in the mathematical theory of diffraction, by V. D. Kupradze. Translated from the Russian by C. D. Benster. National Bureau of Standards project 1101-11-5100. NBS Report 2008. Washington, DC: US Department of Commerce, National Bureau of Standards.

1955 with L. K. Jackson. Computation of harmonic measure by L. Ahlfors' method. In Experiments in the computation of conformal maps. NBS Appl. Math. Ser. 42, 53–61. Washington, DC: US Government Printing Office. Review: *MR* 17,669a (W. Seidel).

1959 Introduction. In *Tables of the Bivariate Normal Distribution Function and Related Functions*, NBS Appl. Math. Ser. 50, v-xvi. Washington, DC: US Government Printing Office. Review: *J. R. Stat. Soc. Ser. A (General)* 123: 488 (K. D. Tocher).

1960 with K. G. Guderley and E. M. Valentine. Tables related to axial symmetric transonic flow patterns. WADC Technical Report 59-710. Washington, DC: US Department of Commerce, Office of Technical Services. Review: *Math. Comp.* 15:218–19 (R. C. Roberts).

1963–65 with D. S. Clemm. Tables relating to the radial Mathieu functions. Vol. 1: Functions of the first kind. Vol. 2: Functions of the second kind. Washington, DC: US Government Printing Office. Reviews: *MR* 26 #6444 (vol. 1) (errata: 27:1399, 30:1203) and 31 #4148 (vol. 2) (C. J. Bouwkamp); *Math. Comp.* 18:159–60 (vol. 1) and 20:179–80 (vol. 2) (H. Hochstadt).

1969 with D. S. Clemm. Mathieu's equation for complex parameters. Tables of characteristic values. [Washington, DC]: Aerospace Research Laboratories, Office of Aerospace Research, US Air Force. Reviews: *MR* 40 #3671 (J. Todd); *Zbl* 204.49902 (A. Schubert); *Math. Comp.* 24:757 (Y. L. L.).

Abstracts not listed above:

1940 with A. N. Lowan. Analysis of computing error in the process of analytic continuation. *Bull. Amer. Math. Soc.* 46:221-22 #147. Presented by title to the AMS, New York City, 24 Feb 1940.

1946 On the computation of Mathieu functions. *Bull. Amer. Math. Soc.* 52:233 #62. Presented to the AMS, New York City, 23 Feb 1946.

1948 On the normalization of Mathieu functions. *Bull. Amer. Math. Soc.* 54:836–37 #399. Presented to the AMS, Vancouver, BC, Canada, 19 Jun 1948.

1952a Note on the numerical solution of differential equations involving linear differential operators. *Bull. Amer. Math. Soc.* 58:572 #548. Presented to the AMS, Eugene, OR, 21 Jun 1952.
1952b On the numerical solution of parabolic partial differential equations. *Bull. Amer. Math. Soc.* 58:46 # 26. Presented to the AMS, Washington, DC, 27 Oct 1951.
1959 Review of basic concepts in approximation theory. *Amer. Math. Monthly* 66:644–45 #5. Presented by invitation to the MAA, Oxford, OH, 9 May 1959.

Presentations not listed above:
Programming for finding characteristic values of Mathieu's equation and the spheroidal wave equation. Presented to the IRE, Los Angeles, 1 May 1952.
Numerical analysis, past and present. Presented to SIAM, Dayton, OH, 20 Mar 1962.

References to: AmMSc 8; AmMWSc 12P–13P, 14; BioWMath; MacTutor.
"Six Women Selected for Federal Award." *New York Times*, 3 Feb 1964.
"Johnson opposes 'stag government.'" *New York Times*, 4 Mar 1964.
Grier, David Alan. "Gertrude Blanch of the Mathematical Tables Project." *IEEE Ann. Hist. Comput.* 19, no. 4 (1997): 18–27.
Grier, David Alan. *When Computers Were Human*. Princeton: Princeton University Press, 2005.

Related manuscript materials:
Gertrude Blanch Papers, 1932–1996 (CBI 162), Charles Babbage Institute, University of Minnesota. Finding Aid.

Unpublished interviews:
Dr. Gertrude Blanch. Interview by Henry Tropp, 16 May 1973, Washington, DC. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution. Transcript.
Gertrude Blanch. Interview by Henry Thacher, 17 Mar 1989, San Diego, CA. Audiotape donated to author by AWM; also listed in Gertrude Blanch Papers.

Other sources: Master's thesis vita 1934; PhD dissertation vita 1935; Owens questionnaire 1940; Division of Rare and Manuscript Collections, Cornell University Library; Former Members of the Department files, Cornell University Department of Mathematics; Ida Rhodes (1900–1986), interview by Henry Tropp, 21 Mar 1973 (transcript); SSDI.

Last modified: January 13, 2016.

BONNER, Harriet (Rees). July 16, 1914–June 28, 1978.
Rockford College (BA 1934), University of Chicago (MS 1935, PhD 1937).

Harriet Rees was born in Mt. Morris, Illinois, the daughter of Wilhelmina (Mina) Marie (Middour) (1883–1955), of Illinois, and Vernon Victor Rees (1882–1956), a native of Iowa, who married in about 1911. Her only sibling, a brother, died as an infant. She grew up on a farm near Mt. Morris, where her father was farming in 1920. In 1930 her father worked in the bindery of a printing plant.

Rees received her elementary and secondary education in the public schools of Mt. Morris and attended nearby Rockford College from 1930 to 1934. At Rockford she was a member of the classical club, the Socratic honor society, and the orchestra. She received a BA with honors in mathematics and a diploma in piano in 1934. She began her graduate work at the University of Chicago in October of 1934 and continued her work there until June 1937 when she received her doctorate. She was a Talcott fellow from Rockford College 1934–35. At Chicago she studied under Mayme Irwin Logsdon, among others, and wrote her master's thesis in number theory under Leonard Eugene Dickson and her PhD dissertation in a related area in abstract algebra under A. Adrian Albert.

Rees was appointed instructor of mathematics at the University of Utah in 1937 and remained there a year and a half before resigning in December 1938. While there she was a member of Sigma Delta Epsilon for graduate women in science. She was married on January 1, 1939, to James Fredrick Bonner (1910–1996), the son of the chairman of the chemistry department at Utah. Bonner had received his PhD from the California Institute of Technology in 1934 and became a distinguished molecular biologist. He was on the faculty at Caltech from 1935 until 1981 and was elected a member of the National Academy of Sciences. The Bonners were divorced in 1966, and James Bonner remarried the following year.

The Bonners had two children, both born in Los Angeles: a daughter, Joey, born June 10, 1948, and a son James José, born May 1, 1950. Both children later earned PhD's, Joey in Chinese intellectual history from Harvard, and J. José in biology from the Massachusetts Institute of Technology. Before their children were born the Bonners were serious climbers. In October 1947 they were awarded emblem status by the Desert Peaks Section of the Sierra Club for having climbed fifteen peaks, including five of the seven designated emblem peaks.

During the 1940s and 1950s Harriet Bonner worked with her husband and his colleagues and received thanks for her mathematical analyses in several publications in biology. She coauthored one paper with James Bonner and another with A. J. Haagen-Smit, an authority on air pollution, who was later elected a member of the National Academy of Sciences.

Harriet Bonner taught mathematics at the continuation high school in Pasadena from 1968 until 1975. She was also an excellent pianist and studied piano and voice at Pasadena City College. She developed symptoms of Alzheimer's disease and was eventually moved to San Francisco, where she died in 1978, shortly before her sixty-fourth birthday.

Organizational affiliations: AMS, Sigma Xi.

Thesis and dissertation:
1935 [Rees, H.] Quartic functions available for Waring theorems. MS thesis, University of Chicago, directed by Leonard Eugene Dickson. Typescript.

1937 [Rees, H.] Ideals in cubic and certain quartic fields. PhD dissertation, University of Chicago, directed by Abraham Adrian Albert. Private edition, distributed by the University of Chicago Libraries.

Publications:

1942 With A. J. Haagen-Smit. Poisonous plants in California. *News Letter Plant Culture League* 4. Reprint: *Lasca Leaves* 17, no. 1 (Jan. 1967): 1–6.

1948 With J. Bonner. The B vitamins as plant hormones. In *Vitamins and Hormones*, ed. R. S. Harris and K. V. Thimann, 6:225–75. New York: Academic Press. Review of book: *Q. Rev. Biol.* 25:259–40 (E. Howard).

Other sources: MS thesis vita 1935; PhD dissertation vita 1937; communications with J. José Bonner (1992, 1998), Rockford College Archives, University of Utah Archives, California Arboretum Foundation; Emblem Holders, Desert Peaks Section, Sierra Club; US Census 1920, 1930 IL.

Last modified: January 22, 2016.

BOWER, Julia Wells. December 27, 1903–February 19, 1999.
Syracuse University (BA 1925, MA 1926), University of Chicago (PhD 1933).

Julia Wells Bower was born in Reading, Pennsylvania, the second of three daughters of Maud Estella (Weightman) (1874–1968) and Andrew Park Bower (1869–1949). Her parents, natives of Pennsylvania, had married on April 10, 1893. They had attended elementary school, her father through fifth grade. He later supplemented this education with night classes and a year at a business college in Reading. Her mother was a housewife; her father was a cigar maker and a labor leader and mediator. He was active at the local and national levels of the Cigar Makers' International Union of America and was national vice president for many years and then president in the 1940s; in the latter role he was editor of the union's publication. He was also vice president of the Pennsylvania Federation of Labor for forty years, and held offices in the Cigarmarkers' Co-operative Association and other state and local labor associations. He was involved in many charitable and religious activities at the community level. These included serving in leadership positions with the Berks County Tuberculosis Society, with the American Red Cross, and with the First Baptist Church of Reading. His political affiliation was Socialist.

Julia Bower's older sister, Esther Weightman (1900–1994), held a master's degree in child development from Pennsylvania State College and was at various times a public school teacher, a home demonstration agent, and the director of a child care center and of the Lancaster, Pennsylvania, nursery school opened by the Harvard trained educator Psyche Cattell. Bower's younger sister, Philippa Park (b. ca. 1906), died in childhood.

Julia Bower attended the public elementary school and high school in Reading. In 1985 she credited the support she received from her family, including that of an aunt who taught junior high school mathematics in Reading, for motivating her. After graduating from high school as salutatorian she went to Syracuse University as holder of a Reading High School alumni scholarship during her first year. While an undergraduate she served as librarian, secretary, and member of the scholarship committee of the Syracuse chapter of Pi Mu Epsilon. After receiving her bachelor's degree in 1925, she continued at Syracuse one more year as a teaching fellow and received her master's degree the next year. While at Syracuse she was elected to several honorary societies.

In 1926 Bower was appointed to a temporary instructorship at Vassar College to replace Mary Evelyn Wells, who was on leave to serve as department head at Women's Christian College at the University of Madras in India during 1926–27. The next three years Bower was instructor at Sweet Briar College in Virginia, where Eugenie Morenus was chair of the department. Bower also was instructor in the summer school at Syracuse during the summers of 1927 through 1931.

Bower began her graduate work for the PhD at the University of Chicago in October 1930 and remained there, except in summers, through June 1933. At that time, she received her degree, having written a dissertation in the calculus of variations as a student of Gilbert Ames Bliss. She held a fellowship 1931–32 and 1932–33 and taught a freshman course during the first quarter of 1932–33.

After receiving her doctorate, Bower went to Connecticut College for Women in New London as instructor in the fall of 1933 and remained there throughout her career. The college, established in 1911, became coeducational and adopted

its present name, Connecticut College, in 1969, shortly before Bower's retirement. While there she was instructor 1933–38, assistant professor 1938–42, associate professor 1942–53, professor 1953–72, and professor emeritus after 1972. She served as department chairman 1943–69. She taught a broad range of courses for majors and, after about 1955, for non-majors, later using her 1965 text, *Introduction to Mathematical Thought*. Her second book, *Mathematics: A Creative Art*, was published the year after she retired. From 1961 to 1967 she served as director and as instructor in NSF in-service institutes for high school teachers that had weekly sessions during the school year.

Bower had a variety of summer teaching experiences. In the summers of 1943–46 she was director and instructor of a training course for engineering aides for the research division of United Aircraft Corporation. She was visiting professor at Washington Square College of New York University in the summer of 1950 and at Boston University in the summer of 1954 and was visiting scholar at the University of Miami in 1962–63.

She was particularly active in the Connecticut Valley Section of the Association of Teachers of Mathematics in New England (ATMNE). She served as secretary 1941–43, vice president 1949–50, president 1950–51, and director 1951–52. She also represented her college at a conference on a general curriculum in mathematics called by the MAA Committee on the Undergraduate Program in Mathematics and held in New York in 1966. That same year she gave a talk at the Senior High School Section of an NCTM meeting in Hartford, Connecticut. She was a fellow of the AAAS.

Bower was a Baptist, was a member of the League of Women Voters, and was active in Pan-Hellenic and sorority work from the early 1920s to the early 1940s; she was national president of Beta Phi Alpha from 1936 to 1940. She was at various times a local officer in AAUW, AAUP, and Phi Beta Kappa and was also a member of Phi Kappa Phi and Pi Lambda Theta. She indicated in 1985 that her hobbies were reading and swimming. Some time after her retirement she moved to Florida, where in 1984 she wrote a history of John Knox Village of Central Florida, a retirement community in Orange City.

Julia Wells Bower died in Florida Hospital Fish Memorial in Orange City, Florida, in 1999 at age ninety-five. She was cremated and her ashes placed in Mid-Florida Crematory in DeLand. Before her death, an anonymous donor established the Julia Wells Bower prize for mathematics in her honor at Connecticut College, which also presents an annual Julia Wells Bower lecture.

Organizational affiliations: AMS, MAA, NCTM, AWM, AAAS, AAUW, AAUP, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Dissertation:

1933 The problem of Lagrange with finite side conditions. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Typescript. Private edition, 1937, distributed by the University of Chicago Libraries, reprinted from *Contributions to the Calculus of Variations, 1933–37*, 1–51.

Publications:

1937 The problem of Lagrange with finite side conditions. In *Contributions to the Calculus of Variations, 1933–37*, 1–51. Chicago: University of Chicago Press. Published version of PhD dissertation. Reviews: *JFM* 63.0480.04 (H. Boerner); *Zbl* 018.02801 (A. Dresden). Review of volume: *Bull. Amer. Math. Soc.* 44:604–09 (A. Dresden). Presented to the AMS, Chicago, 19 Jun 1933; abstract: *Bull. Amer. Math. Soc.* 39:512–13 #237.

1943 The effect of war on college women and mathematics. *Math. Teacher* 36:175–78.
1945 A training course for engineering aides. *Math. Teacher* 38:323–26.
1951a An application of determinants to the probability of mated pairs. *Amer. Math. Monthly* 58:238–44. Reviews: *MR* 12,665e (J. Riordan); *Zbl* 042.13701 (A. Sade).
1951b Review of *Primer of College Mathematics*, by J. F. Randolph (New York: The Macmillan Co., 1950). *Amer. Math. Monthly* 58:350.
1954 Mathematics as a creative art. *Math. Teacher* 47:2–7.
1965 *Introduction to Mathematical Thought*. Prelim. ed. San Francisco: Holden-Day.
1973 *Mathematics: A Creative Art*. San Francisco: Holden-Day. Reviews: *Amer. Math. Monthly* 80:1155 (F. L. Wolf); *Math. Mag.* 47:164–65 (R. Longcore).

Presentations not listed above:
Discontinuities. Presented to the ATMNE, Deerfield, MA, 1943.
Geodesics on a polyhedron. Presented to the ATMNE, Boston area, 1950.
Cartesian rather than Euclidean geometry. Lecture series at ATMNE Summer Institute, Cambridge, MA, 1951.
Non-Euclidean geometry. Presented to the ATMNE, Cambridge or Boston, MA, 1953.
Matrices. Lecture series at ATMNE Summer Institute, Cambridge, MA, 1954.
Mathematical proof. Presented to the ATMNE, Cambridge or Boston, MA, 1955.
Theory of numbers. Lecture series at ATMNE Summer Institute, Kingston, RI, 1959.

References to: AmMSc 6–8, 9P–11P; AmWom 1935–40; WhoAmW 5–6; ConAu 41R.
Hostinsky, Aileen L. "Julia Wells Bower" in "Retirements." *Connecticut College Alumnae News*, n.d.
"Julia Wells Bower." (Obituary) *Orlando Sentinel*, 23 Feb 1999.

Other sources: PhD dissertation vita 1933; Owens questionnaire 1937; Smithsonian questionnaire 1985; Owens Papers; communication with Connecticut College Archives; NatCAB 38 (Bower, Andrew Park); US Census 1900, 1910, 1920, 1930 PA; Florida death certificate; SSDI.

Last modified: March 6, 2009.

BOYCE, Fannie W. March 16, 1897–February 13, 1986.
Central Holiness University (BA 1918), Penn College (BA 1921), University of Wisconsin (MA 1928), University of Chicago (PhD 1938).

Fannie Wilson Boyce was born near Lentner, in Shelby County, Missouri, and moved to Colorado with her younger sister and her parents, Mary Virginia (King) (1867–1956) and George Wesley Boyce (1866–1942), when she was four. Her mother was born in Missouri and her father in Delaware. Her parents had married on April 18, 1895. Her father was a farmer in Missouri in 1900 and later a grocer. Her sister, Lura (1898–1990), was also born in Missouri, earned a BA, taught mathematics, married, and was a county treasurer for sixteen years.

The family was living in Colorado Springs in 1900, and Fannie Boyce attended grade school in Colorado 1903–10. Her family moved to University Park, Iowa, and she did her high school and first college work there. She indicated in her PhD dissertation vita that she was at the academy of John Fletcher College 1910–14 and received her BA from John Fletcher College in 1918. The college was called Central Holiness University at the time she was there; it adopted the name John Fletcher College in 1925. After her graduation from college in 1918, she taught in Iowa high schools two years; she taught mathematics in Leon 1918–19 and mathematics and Latin in Rolfe 1919–20. She then attended Penn College (now William Penn University), a Quaker college in Oskaloosa, Iowa, where her sister had earned her BA in 1919. Boyce was at Penn College one year to earn a second bachelor's degree in 1921.

Boyce taught at two schools during the next six years. In both she taught mathematics at the academy level and the first two years of Greek at the college level. In 1921–22 she was at Olivet University (Olivet College after 1923, now Olivet Nazarene University) in Illinois, and in 1922–27 she was at Marion College in Indiana.

Boyce studied at the University of Wisconsin during the academic year 1927–28 and received a master's degree in 1928. After receiving her degree she applied for a position at Wheaton College in Illinois "but was turned down, since the dean was looking for 'a man with a PhD'" (David D. Malone, Special Services, Buswell Memorial Library, Wheaton College to J. LaDuke, 29 Oct 1991). She taught in the high school in Platteville, Wisconsin, 1928–29 and in the high school and junior college in LaSalle, Illinois, the following year before being hired by Wheaton College in 1930. Professor E. B. Skinnerof Wisconsin wrote in a letter of recommendation to the college president on January 29, 1930, that "during her residence here she was regarded as one of the most careful and conscientious students that we had at that period. She never took anybody's word for anything, and was never satisfied until she had herself gone through every step of detail in the demonstration of every theorem and every problem. She did excellent work .... She is a high class woman in every way; a sincere and devoted member of one of the smaller Protestant churches, and is without a trace of frivolity or careless attitude toward her work and toward her associates" (Wheaton College Archives).

Boyce remained at Wheaton as assistant professor 1930–41, associate professor 1941–46, and professor 1946–62. She pursued her graduate work at the University of Chicago by taking leaves of absence in the academic years 1933–34 and 1936–37 and by taking courses every summer 1933–37 except 1936. She received her doctorate

in August 1938. At some point during her tenure at Wheaton she was chosen to participate in a summer institute at Stanford sponsored by the National Science Foundation.

Boyce's parents lived with her when she was in Illinois. It appears that they were living in Chicago, at least in 1936–37 while she was completing her graduate work, and moved to Wheaton when she returned to resume her position at the college. Her father died in 1942. In March 1953 Boyce offered to resign since she was unable to carry her full load because of the time she needed to care for her mother, who was injured nearly a year earlier. Her mother died about three years later.

After her retirement from Wheaton College in 1962 as professor emeritus, Boyce took a position as associate professor at Olivet Nazarene College, where she taught from 1963 to 1970. She was then at Owosso College in Michigan in 1970. She returned to Wheaton, where she was a member of the Wheaton Bible Church and tutored students in her home until she was in her eighties.

Fannie Boyce was a resident of a heath care center in Lombard, Illinois, at the time of her death from cardiac arrest at eighty-eight in 1986. It was noted in her obituary that she was an accomplished artist, working with oils. She was survived by her sister and nieces and nephews.

Organizational affiliation: MAA.

Thesis and dissertation:
1928 A determination of types of groups whose orders are less than 18. MA thesis, University of Wisconsin, directed by Ernest Brown Skinner.
1938 Certain types of nilpotent algebras. PhD dissertation, University of Chicago, directed by Abraham Adrian Albert. Private edition, distributed by the University of Chicago Libraries.

References to: AmMSc 7–8; AmMWSc 12P.
"Dr. Fannie Boyce, Lombard." (Obituary) unidentified newspaper clipping, 1986.

Related manuscript material:
Oral History Collection, Wheaton College Archives, Wheaton, IL.

Other sources: PhD dissertation vita 1938; Owens questionnaire 1940; Smithsonian questionnaire 1985; University of Wisconsin Archives; Wheaton College Archives (Academic Affairs (RG 3.3) Record Group); US Census 1900 MO, 1910 CO, 1920, 1930 IA.

Last modified: December 8, 2008.

BRADY, Dorothy (Stahl). June 14, 1903–April 17, 1977.
Reed College (BA 1924), Cornell University (MA 1926), University of California (PhD 1933).

Dorothy Elizabeth Stahl was born in Elk River, Minnesota, the eldest of four children of Agnes M. (Roche) and Henry V. Stahl, both born in 1875 in Wisconsin. In 1900 Agnes Roche and Henry Stahl were both teachers and boarded at the same address in Graceville, Minnesota. They married two years later. Their other children were a daughter, Margaret, born in Elk River in about 1904, and two sons, Donald and George, born in Wisconsin in about 1909 and 1910, respectively. In 1910 the family was living in Bayfield, Wisconsin, where Henry Stahl was a high school teacher. By 1920 they were living in Portland, Oregon, and Henry Stahl was working as an insurance agent.

Dorothy Stahl attended Lincoln High School in Portland and studied mathematics and physics at Reed College, where she was a student assistant and from which she graduated as a mathematics major in 1924. On June 14, 1924, in Portland, Oregon, she married Robert Alexander Brady (1901–1963), who had graduated from Reed College the previous year and remained at Reed as a teaching assistant in history 1923–24. Robert Brady, born in Marysville, Washington, worked as a principal of a high school in Florence, Oregon, 1924–25, studied at Cornell 1925–26, worked in the New York City area 1926–29, and received a PhD in economics from Columbia University in 1929. In 1929 he joined the University of California faculty.

Dorothy Brady attended graduate school at Cornell 1925–26. She received her master's degree in mathematics in 1926 with major subject mathematical analysis and minor subject geometry; her examination committee was chaired by W. A. Hurwitz. Brady was instructor of mathematics the following year, 1926–27, at Vassar College. In 1927 she worked at the National Bureau of Economic Research as a research assistant on a study of labor statistics before studying and teaching mathematics and economic statistics at New York University 1927–29; Robert Brady also taught at NYU during those two years. Dorothy Brady continued her study of mathematics at the University of Berlin in Germany during the winter of 1930–31 when Robert Brady had a research fellowship to study the "rationalization" of industry in Germany. She then attended the University of California 1931–33 and received a PhD in mathematics in 1933.

The Bradys' son, M. Michael, was born in December 1933. Soon after that Robert Brady left them, moved to Washington, D.C., and later remarried. Michael Brady earned a master's degree from MIT in 1958 and was awarded a Fulbright fellowship to study electrical engineering in Oslo for the following year. He is an engineer living in Oslo and writes about Nordic skiing and living abroad.

In 1936 Dorothy S. Brady began a long career as an economist and statistician working for the federal government and in academic institutions. She worked first for the government in Washington, D.C., for a dozen years. From 1936 to 1943 she worked for the US Department of Agriculture. She worked in the area of family expenditures for the Bureau of Home Economics (renamed Bureau of Human Nutrition and Home Economics in February 1953). She was an associate economist 1936–38, home economics specialist 1938–42, and senior statistician 1942–43. During the years 1937–39 she also studied statistics at the US Department of Agriculture Graduate School.

In 1943 she moved to the US Department of Labor, where she held positions within the Bureau of Labor Statistics. In 1943–44 she was chief of the family expenditure section within the cost of living division and served as assistant chief of the division. From 1944 to 1948 she was chief of the cost of living division and was responsible for the analytical procedures used in the consumer price index, the derivation and pricing of the city worker's family budget, and economic analysis of family expenditure data. During this period she wrote articles, some of which appeared without attribution, for the *Monthly Labor Review* of the Bureau of Labor Statistics. She also served as vice president (1944–45) and president (1945–46) of the Washington Statistical Society, a chapter of the American Statistical Association (ASA). Brady was a lecturer for a graduate course at American University in the spring of 1946.

In 1948 Brady assumed positions at the University of Illinois. She was appointed professor of economics to serve half time to teach quantitative economics in the Department of Economics. She was also research professor of economics half time and conducted research in the field of consumer economics in the Bureau of Economic and Business Research in the College of Commerce. Seven letters of recommendation for Brady for these positions from persons she had worked with in academic and government settings are uniformly enthusiastic. A letter of February 13, 1948, from Milton Friedman, later to win the Nobel Memorial Prize in Economic Sciences, begins, "I find it difficult to use anything except superlatives in describing Dorothy Brady's qualifications for a teaching and research position" (Staff Appointments File for Dorothy Stahl Brady, University Archives, University of Illinois at Urbana-Champaign).

In 1951, while at Illinois, Brady also became a consultant on costs and standards of living for the Bureau of Labor Statistics. Because of these research commitments, she requested and was granted a leave of absence without pay from her Illinois positions for most of second semester 1950–51. Because of her commitment to help with the revision of the consumer price index, she then resigned those positions effective August 31, 1951, in order to return to full-time government service in Washington. In her role as the consultant on costs and standards of living for the Department of Labor, Brady spoke at an equal pay conference called by the department's Women's Bureau in March 1952. She noted a dramatic decrease over ten years in the ratio of women's to men's earnings, "from 59 to 45 per cent" ("Crusade advocated to force equal pay," *New York Times*, 1 Apr 1952).

In 1953 Brady was chief of the division of prices and cost of living and was responsible for price indexes, consumer expenditure surveys, and other cost of living surveys. During the early 1950s she presented several papers at the Conference on Research in Income and Wealth of the National Bureau of Economic Research; she served on the executive committee of the conference and chaired the committee in 1953–54.

In 1956 she resumed her work in an academic setting when she joined the faculty at the University of Chicago as professor of economics. Two years later, in 1958, she moved to the Wharton School of the University of Pennsylvania, also as professor of economics, and remained until her retirement a dozen years later. For the period 1956 to 1960, she was again a consultant to the Bureau of Labor Statistics on prices and cost of living. From 1964 to 1971 she was a consultant to the Social Security Administration, Office of Research and Statistics, working mainly on a project on

age and income distribution and on plans for a retirement history study. She served as book review editor of the *Journal of Economic History* 1969–74. Brady retired from the Wharton School in 1970 as professor emeritus but was a consultant there until 1974. While at Wharton, she was research professor of economics and for the period 1964–70 was chairman of the graduate group in economic history.

In 1948 Brady received the National Women's Press Club Award in Economics for her work in developing the city worker's family budget. In 1949 she was elected a fellow of the American Statistical Association and the following year she was elected a fellow of the Econometric Society. Richard Easterlin, her colleague and friend at the Wharton School, describes some of her personal qualities in his article in the *Journal of Economic History* after her death. "She was sensitive, considerate, and utterly without pretense. I never knew a person less given to small talk; yet she was always interesting and fun to be with."

Dorothy Brady suffered from a heart ailment and died in 1977 at the home she shared with her friend and fellow economist, Eleanor M. Snyder, in Pine Hill, New York. Brady was seventy-three at the time of her death. She was survived by her son, Michael Brady, of Oslo, Norway, and her sister. There was no funeral and her body was donated to science.

Organizational affiliations: AMS, ASA (fellow), IMS, Econometric Soc. (fellow), Econ. Hist. Assoc., Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1926 Criteria for convergence of Fourier series. MA thesis, Cornell University, directed by Wallie Abraham Hurwitz.

1933 On the solutions of the homogeneous linear integral equation. PhD dissertation, University of California, directed by John Hector McDonald.

Selected publications:

1938 Variations in family living expenditures. *J. Amer. Statist. Assoc.* 33:385–89. Presented to the ASA, Atlantic City, NJ, 30 Dec 1937.

1944 with S. Fabricant. Appraisal of the U.S. Bureau of Labor Statistics cost of living index: appendix. *J. Amer. Statist. Assoc.* 39:57-95. Prepared for a special committee of the ASA with the assistance of the staff of the US Bureau of Labor Statistics.

1945 with F. M. Williams. Advances in the techniques of measuring and estimating consumer expenditure. *J. Farm Econ.* 27: 319–20.

1946 Expenditures, savings, and income. (In Five Views on the Consumption Function) *Rev. Econ. Statist.* 28:216–18.

1947a with R. D. Friedman. Savings and the income distribution. In *Conference on Research in Income and Wealth*, 247–65. Studies in Income and Wealth 10. New York: National Bureau of Economic Research. Presented to the conference, Nov 1945.

1947b Comment on "Resource distribution patterns and classification of families" by W. Vickrey. In *Conference on Research in Income and Wealth*, 317–21. Studies in Income and Wealth 10. New York: National Bureau of Economic Research. Presented to the conference, Nov 1945.

1948a Family budgets: A historical survey. *Monthly Labor Rev.* 48:171–75.

1948b with H. A. Barber. The pattern of food expenditures. *Rev. Econ. and Statist.* 30:198–206.

1948c with L. S. Kellogg. The city worker's family budget: General description of purpose and methods followed in developing the budget for 34 cities in the spring of 1946 and summer of 1946. *Monthly Labor Rev.* 48:133–70.

1949a Influence of age on saving and spending patterns. *Current Econ. Comment* 11 (Nov): 51–58. Updated in 1955 by M. M. Froeder, *Monthly Labor Rev.* 78: 1240-44.

1949b The use of statistical procedures in the derivation of family budgets. *Soc. Service Rev.* 23 (2): 141–57. Presented to the ASA, Cleveland, OH, 28 Dec 1948.
1951a Research in the size distribution of income. In *Conference on Research in Income and Wealth*, 2–55. Studies in Income and Wealth 13. New York: National Bureau of Economic Research. Comment by M. Friedman 55–60. Presented to the conference, Apr 1949.
1951b Scales of living and wage earners budgets. *Ann. Amer. Acad. Polit. Soc. Sci.* 274, Labor in the American economy: 32–38.
1951c Review of *Shares of Upper Income Groups in Income and Savings*, by S. Kuznets. *J. Amer. Statist. Assoc.* 46:267–69.
1951d Review of *Variations in Working Class Family Expenditure*, by J. L. Nicholson. *J. Amer. Statist. Assoc.* 46:269–70.
1952 Family savings in relation to changes in the level and distribution of income. In *Conference on Research in Income and Wealth: Income Size Distributions*, 103–30. Studies in Income and Wealth 15. New York: National Bureau of Economic Research. Presented to the conference, Allerton Park, IL, June 1950.
1953a Changing consumer spending patterns. *Conf. Board Business Record* 10:244–49. Presented to the Natl. Industrial Conference Board, Cincinnati, OH, June 1953.
1953b Review of *Der Haushalt: Eine Darstellung seiner volkswirtschaftlichen Gestalt*, by E. Egner. *J. Polit. Econ.* 61:273–74.
1954a The Kinsey report on females. Review of *Sexual Behavior in the Human Female*, by A. C. Kinsey, W. B. Pomeroy, C. E. Martin, and P. H. Gebhard. *J. Amer. Statist. Assoc.* 49:696–705.
1954b Review of *Bibliography on Income and Wealth, Vol. II. 1948–1949*, ed. P. Deane. *J. Amer. Statist. Assoc.* 49:395–99.
1955 Review of *Income and Wealth, Series III*, ed. M. Gilbert. *Rev. Econ. Statist.* 37:91–92.
1956a Review of *Consumers' Expenditure in the United Kingdom, 1900–1919*, by A. R. Prest. *J. Polit. Econ.* 64:176.
1956b with R. W. Goldsmith and H. Mendershausen. *A Study of Saving in the United States. Vol. III: Special Studies*. Princeton, NJ: Princeton University Press. Vols. I and II by R. W. Goldsmith. Reviews of vol. 3: *Econometrica* 25:370–72 (L. R. Klein); *J. Polit. Econ.* 65:449–50 (F. W. Paish). Reviews of vol. 1–3: *J. Amer. Statist. Assoc.* 51:677–82 (G. Garvy) (vol. 1–3); *Rev. Econ. Statist.* 38:338–43 (H. Lydall).
1958 Individual incomes and the structure of consumer units. *Amer. Econ. Rev.* 48:269–78. Presented to the Amer. Econ. Assoc.
1963a Review of *1961 Survey of Consumer Finances*, by G. Katona, C. A. Lininger, J. N. Morgan, and E. Mueller. *J. Amer. Statist. Assoc.* 58:253–54.
1963b Review of *Household Saving and the Price Level*, by S. Thore. *Econometrica* 31:616–17.
1964a Relative prices in the nineteenth century. *J. Econ. Hist.* 24:145–203.
1964b Review of *Unionism and Relative Wages in the United States: An Empirical Inquiry*, by H. G. Lewis. *Ann. Amer. Acad. Polit. Soc. Sci.* 356, The non-western world in higher education: 201.
1964c with F. G. Adams. The diffusion of new durable goods and their impact on consumer expenditures. In *Proceedings of the Business and Economic Statistics Section*, 76–88. Washington, DC: American Statistical Association. Presented to a meeting of the ASA, Cleveland, OH, 4–7 Sept 1963; abstract *J. Amer. Statist. Assoc.* 59:581.
1965a Review of *Anticipations and Purchases, an Analysis of Consumer Behavior*, by F. T. Juster. *J. Marketing Res.* 2:202–04.
1965b Review of *Estimates of Residential Building, United States, 1840–1939*, by M. Gottlieb. *J. Amer. Statist. Assoc.* 60:373–74.

1966a Introduction. In *Output, Employment, and Productivity in the United States after 1800*, ix–xiv. Studies in Income and Wealth 30. New York: National Bureau of Economic Research.
1966b Price deflators for final product estimates. In *Output, Employment, and Productivity in the United States after 1800*, 91–115. Studies in Income and Wealth 30. New York: National Bureau of Economic Research. Presented to the Conference on Research in Income and Wealth and a meeting of the Econ. Hist. Assoc., Chapel Hill, NC, 2–3 Sept 1963.
1966c Review of *Consumer Demand in the United States 1929–1970—Analyses and Projection*, by H. S. Houthakker and L. D. Taylor. *Southern Econ. J.* 33:276–78.
1966d Review of *Distribution of Family Incomes in Puerto Rico: A Case Study of the Impact of Economic Development on Income Distribution*, by F. M. Andic. *Ann. Amer. Acad. of Polit. Soc. Sci.* 363, Ethics in America: Norms and Deviations: 196.
1970 Review of *Consumer Response to Income Increases*, by A. G. Katona and E. Mueller. *J. Marketing Res.* 7:266-67.
1971 The statistical approach: The input-output system. In *Approaches to American Economic History*, eds. G. R. Taylor and L. F. Ellsworth. Charlottesville: Univ. Press of Virginia.
1972 with L. E. Davis, R. A. Easterlin, W. N. Parker, A. Fishlow, R. E. Gallman, S. Lebergott, R. E. Lipsey, D. C. North, N. Rosenberg, E. Smolensky, and P. Temin. *American Economic Growth: An Economist's History of the United States.* New York: Harper & Row. Drafted section on consumption.

Technical reports:
1940a with T. Dreis, D. Monroe, and G. S. Weiss. Family income and expenditures. Pt. 1, vol. 4: Family income. Southeast region. US Department of Agriculture Miscellaneous Publication no. 375. Washington, DC.
1940b with D. S. Martin, D. Monroe, and E. Phelps. Family income and expenditures. Middle Atlantic, north central and New England regions. Pt. 1: Family income. US Department of Agriculture Miscellaneous Publication no. 383. Washington, DC.
1940c with D. Monroe, E. Phelps, and E. D. Rainboth. Family income and expenditures. Pt. 2: Family expenditures. Five regions. US Department of Agriculture Miscellaneous Publication no. 396. Washington, DC.
1941a with K. L. Benson, J. F. Constantine, and D. Monroe. Family expenditures for automobile and other transportation, five regions. US Department of Agriculture Miscellaneous Publication no. 415. Washington, DC.
1941b with Y. A. Carmel, M. W. Ellsworth, D. Monroe, and J. H. Murray. Changes in assets and liabilities of families: five regions. US Department of Agriculture Miscellaneous Publication no. 464. Washington, DC.
1941c with M. H. Coffin, D. Monroe, and M. Y. Pennell. Family expenditures for education, reading, recreation, and tobacco, five regions. US Department of Agriculture Miscellaneous Publication no. 456. Washington, DC.
1941d with K. E. Cronister, D. Monroe, M. M. Perry, and E. D. Rainboth. Family income and expenditures, five regions: Pt. 2, family expenditures. US Department of Agriculture Miscellaneous Publication no. 465. Washington, DC.
1941e with H. Kyrk, D. Monroe, E. D. Rainboth, and C. Rosenstiel. Family expenditures for housing and household operation, five regions. Vol 2: Farm series. US Department of Agriculture Miscellaneous Publication no. 457. Washington, DC.
1941f with D. Monroe, M. M. Perry, and M. R. Pratt. Family income and expenditures: Southeast region: Pt. 1, family income. US Department of Agriculture Miscellaneous Publication no. 462. Washington, DC.

1941g with D. Monroe, E. D. Rainboth, and E. D. Riley. Family expenditures for personal care, gifts, selected taxes, and miscellaneous items, five regions. US Department of Agriculture Miscellaneous Publication no. 455. Washington, DC.
1960 with E. M. Snyder. The relation of family status to income and to participation in the labor force, New York State, 1956. New York (State) Department of Labor. Division of Research and Statistics. Publication no. B-113. [Albany?]: State of New York, Department of Labor.
1962 with F. G. Adams. The diffusion of new products and their impact on consumer expenditures. Philadelphia: Department of Economics, University of Pennsylvania, for US Bureau of Labor Statistics.
1965 Age and the income distribution. US Social Security Administration. Division of Research and Statistics. Research report, no. 8. Washington, DC.

Abstracts not listed above:
1956 with P. Kerschbaum. Adjustments of families to income reverses. *J. Amer. Statist. Assoc.* 51:505–06. Presented to meeting of the ASA, New York City, 27–29 Dec 1955.

Presentation not listed above:
The relation of income to expenditures. Presented to the ASA and the Econometric Soc., Chicago, 19 Dec 1950.

Selected references to: PeoHis.
"Dr. Dorothy S. Brady, 73, Is Dead." *New York Times*, 20 Apr 1977.
"Dr. Dorothy S. Brady." Emeritus Professor." (Obituary) *Philadelphia Evening Bulletin*, 20 Apr 1977.
"Dorothy S. Brady, Economist, Was Wharton School Professor." (Obituary) *Washington Post*, 22 Apr 1977.
"Dorothy Brady, An Authority on Income, Savings." (Obituary) *Washington Star*, 23 Apr 1977.
"Dorothy S. Brady." (Obituary) *Allen's P.C.B.* (Portland), April 1977.
Easterlin, Richard A. "Dorothy Stahl Brady, 1903–1977." *J. of Econ. Hist.* 38 (Mar 1978): 301–03.

Other sources: Division of Rare and Manuscript Collections, Cornell University Library; University of California, Berkeley, Library; University of Pennsylvania Archives; Vassar College Archives; communications with University of Illinois at Urbana-Champaign Archives and with Reed College Alumni Office; WhAm 4 (Brady, Robert Alexander); "Against decadence: The work of Robert A. Brady (1901–63)" by Doug Dowd. *J. Econ. Issues* 28 (1994): 1031–61; "Washington Statistical Society, Past and Present, 1896 to 2012"; US Census 1900 MN, 1910 WI, 1920, 1930 OR, 1930 CA, 1940 DC.

Last modified: January 22, 2016.

BROWN, Eleanor (Pairman). June 8, 1896–September 14, 1973.
University of Edinburgh (MA 1917), Radcliffe College (PhD 1922).

Eleanor Pairman was born in Broomieknowe, Lasswade, in the parish of Cockpen, Midlothian, Scotland, the youngest of four daughters of Helen (Dunlop) (b. ca. 1858) and John Pairman (b. ca. 1854), solicitor, Supreme Courts of Scotland. Her parents married in Edinburgh on July 1, 1886. Her father died when she was quite young, apparently before 1901, leaving her mother with few resources to raise her family. Eleanor's sisters were Maxwell (Maxie) (b. ca. 1888), Margaret (Madge) (b. ca. 1890), and Adeline (Aline) (b. ca. 1891); they did not marry. According to information supplied by John Pairman Brown, Eleanor's eldest son, Maxie taught at a boarding school in England; Madge was proprietor of a tea shop, "The Ancient Grudge," northeast of Edinburgh; and Aline did some baby minding and kept the Pairman family home in Broomieknowe. Eleanor was known as Nora by her family.

Nora Pairman attended Lasswade Higher Grade School 1903–08 and George Watson's Ladies' College 1908–14 before enrolling in the University of Edinburgh. Three years later, in 1917, she received her MA with first class honours in mathematics and natural philosophy. At that time the master's degree was the first degree given in universities in Scotland. The year she received her master's degree, she was awarded the Vans Dunlop scholarship in mathematics, a three-year scholarship, awarded by competitive examination, which could be used for study at any university. It was awarded for "'distinguished proficiency' in the various subjects of competition as determined by the Examiners and the Senatus Academicus" (*Edinburgh University Calendar 1917–1918*, 269). Pairman continued her studies as a graduate student in mathematics at the University of Edinburgh 1917–18.

Eleanor Pairman read two papers at meetings of the Edinburgh Mathematical Society early in 1918. On February 4, 1918, Cargill G. Knott, then president of the society and one of Pairman's instructors at Edinburgh, wrote a letter of recommendation to the dean of Radcliffe College in Massachusetts. He indicated that Pairman intended to continue her studies at Radcliffe. He wrote:

> Throughout her career as an undergraduate Miss Pairman's exceptional mathematical abilities were in strong evidence. Although her natural inclinations were towards Pure Mathematics, she easily mastered the Principles and Methods of Applied Mathematics, and gained the Medal in both my Honours Classes in Dynamics and Hydrodynamics, and this among a group of students of marked ability. Miss Pairman also attended a short course I give on Hamiltonian Quaternions with Physical Applications, and there I was impressed with her capacity for appreciating the theoretical foundations of the calculus.
>
> Very rarely indeed have we had the good fortune of teaching a student with such a strong predilection for mathematical study as Miss Pairman undoubtedly possesses. With fitting opportunity she has every promise of a distinguished and useful career. (Letter provided to author by John Pairman Brown)

During 1918–19 Pairman was a graduate student in applied statistics at the University of London and joined the staff of Karl Pearson's laboratory in the Department of Applied Statistics at University College London. In 1919 they published an

article in *Biometrika*, a journal that Pearson edited. In the same issue in which their article appeared, Pearson published an editorial, "Peccavimus! [We have sinned!]," in which he corrected a previous article and noted, "As the problem is an exceedingly important one the writer asked Miss Eleanor Pairman to revise his work.... This she has done with certain additions and expansions" (12:267). Also in 1919, Pairman produced the first volume of tables in the *Tracts for Computers* series edited by Pearson.

At about the same time, Karl Pearson wrote to the United States consul in London indicating that Pairman had been granted a scholarship at Radcliffe College, noting that he had done what he could to obtain a passport for her, and requesting that she be admitted to the United States. Eleanor Pairman arrived in New York from London on October 12, 1919, to begin her studies at Radcliffe College. She finished her dissertation in analysis under the direction of G. D. Birkhoff in the fall of 1921 and received her doctorate from Radcliffe College in 1922. She was the third of nine women to receive a doctorate in mathematics from Radcliffe before 1940.

On August 10, 1922, Eleanor Pairman and Bancroft Huntington Brown, a fellow graduate student, were married at Roselea, the Pairman home in Broomieknowe, Scotland. B. H. Brown was born on November 11, 1894, in Hyde Park, Massachusetts, and received a bachelor's degree in 1916 and a master's degree in 1917 from Brown University. B. H. Brown served in the US Army 1917–19; an article by Fenster, Kent, and Archibald notes that he was discharged in order to teach at Harvard University, where mathematics instructors were urgently needed. He served as instructor 1919–21 and continued his graduate work in mathematics there. He received his doctorate in June 1922, the same time as Eleanor Pairman.

After receiving their doctorates, Bancroft and Nora Brown moved to Hanover, New Hampshire, where B. H. Brown joined the faculty of Dartmouth College, then a men's school with an all-male faculty that had occasionally admitted women as graduate students. He remained at Dartmouth his entire career; he was an instructor 1922–24, assistant professor 1924–31, professor 1931–46, and B. P. Cheney professor until his retirement in 1962. He was director of the Navy V-12 mathematics training program at Dartmouth 1943–45.

The Browns had four children: John Pairman (1923–2010), Barbara (1925–1979), Joanna (1935–1935), and Margaret Wylde (b. 1937). Soon after her first two children were born, Eleanor P. Brown published a paper with Rudolph E. Langer that had originated in Brown's dissertation. Langer was another 1922 Birkhoff student who had also come to Dartmouth in 1922, and who remained on the faculty there until 1925.

John Pairman Brown, the eldest child, majored in mathematics and classics at Dartmouth, was in the US Army Air Corps, was a junior fellow at Harvard, and later earned a doctorate from Union Theological Seminary. His positions included ones at American University of Beirut, the Ecumenical Peace Institute in San Francisco, the Northern California Ecumenical Council, and the Graduate Theological Union, among others. He served as a representative to peace events at various places throughout the world and published extensively, mainly in classics and on New and Old Testament themes. Barbara Brown graduated from Vassar in three years after majoring in English and classics. She earned both a master's degree and a PhD in language and literature from Rutgers University and was a lecturer in English at

the Rutgers Newark campus for several years before her death at fifty-four. Margaret Brown studied at Brown University and became a medical editor and medical transcriptionist. All of the children married and had families.

Most summers the Brown family went to Martha's Vineyard, where B. H. Brown's parents had a small cottage. His parents also spent about four months a year with the Browns in Hanover. Otherwise, there was little traveling; neither Nora nor B. H. Brown drove an automobile or traveled by air. However, Nora Brown did take John and Barbara, the two older children, to Scotland for visits twice when they were young, once in summer 1929 and again in summer 1934; and in March of 1936, she and Barbara made a trip to Bermuda. Also, often in the spring she took a train to Boston to see the flower show and stayed overnight.

It appears that Nora Brown began to learn Braille in about the late 1940s or early 1950s. Her daughter Margaret recalled that after learning regular Braille, she then learned the Nemeth Code for mathematical notation. In a letter to one of the authors, Margaret wrote, "Geometry was a particular problem, because you really need diagrams. Braille is done on paper like thin cardstock. So she rounded up all kinds of household implements like pinking shears and pastry wheels and such and created diagrams that could be felt with the fingers, like the Braille symbols. Apparently nobody had ever done this before." Nora Brown's son-in-law Thomas Streeter recalled a visit to Hanover in which he was shown some of her work. "A graduate student at Harvard was blind and needed a particular book put into Braille, and it was full of mathematical symbols. What to do? The sewing machine, of course. She had written down the math and had it beside the machine. She put a piece of Braille paper under the foot and proceeded to reproduce the symbols by guiding the paper under the needle. It had to be the mirror image of what she had written." An article in the *Hanover Gazette*, probably published in 1959, indicated that she had just returned from attending the Third Annual Conference of the National Braille Club in New York, where mathematical workshops were directed by Abraham Nemeth. The article indicated that she was transcribing two mathematical texts, one for a freshman at Boston College and one a reference book on group theory for a post-graduate course at Columbia University. The article also noted that in addition to her work with Braille, she was holding conferences with Dartmouth freshmen three hours a week, and that she had taken over a course at the end of spring term.

Her daughter Margaret also wrote: "For all the satisfaction that she got from these [Braille] projects, the only time I saw her truly happy was when she was teaching. And she had precious little opportunity to do that, being obviously ahead of her time and also stuck in a males-only college community and in a world where it was well-nigh impossible for married ladies to function professionally." Eleanor P. Brown was, however, a part-time instructor of mathematics at Dartmouth from September 1955 until June 1959.

After a lengthy illness, Eleanor P. Brown developed metastatic breast cancer and was in a nursing home in nearby White River Junction, Vermont, until her death there at age seventy-seven in 1973. She was survived by her husband, two sisters, three children, seven grandchildren, and one great-granddaughter. Bancroft H. Brown died on May 7 the following year.

Theses and dissertation:
1920 [Pairman, E.] Singular points of algebraic space curves. Minor thesis, Radcliffe College. Handwritten.
1921 [Pairman, E.] The absolute differential calculus and its applications. Minor thesis, Radcliffe College. Handwritten.
1922 [Pairman, E.] Expansion theorems for solutions of a Fredholm linear, homogeneous, integral equation of the second kind, with kernel of special nonsymmetric type. PhD dissertation, Radcliffe College, directed by George David Birkhoff. Typescript. See also **1927**.

Publications:
1918 [Pairman, E.] On a difference equation due to Stirling. *Proc. Edinburgh Math. Soc.* 36:40–60. Reviews: *JFM* 46.0714.04 (D. M. Wrinch); *Rev. semestr. publ. math.* 27, pt. 3: 32 (W. Boomstra). Presented to the Edinburgh Math. Soc., 11 Jan 1918.
1919a [Pairman, E.] *Tables of the Digamma and Trigamma Functions.* Tracts for Computers, ed. K. Pearson, no. 1. Cambridge: Cambridge University Press and Chicago: University of Chicago Press. Review: *Amer. Math. Monthly* 28:265–66. Reprint: 1954. Cambridge: Cambridge University Press.
1919b [Pairman, E.] with K. Pearson. On corrections for the moment-coefficients of limited range frequency distributions when there are finite or infinite ordinates and any slopes at the terminals of the range. *Biometrika* 12:231–58. Review: *J. Royal Stat. Soc.* 83:172.
1927 with R. E. Langer. On a class of integral equations with discontinuous kernels. *Trans. Amer. Math. Soc.* 29:683–715. Published version of part of PhD dissertation. Review: *JFM* 53.0351.02 (A. Hammerstein). Presented by R. E. Langer as "On the theory of integral equations with discontinuous kernels" to the AMS, Philadelphia, PA, 28 Dec 1926; abstract: *Bull. Amer. Math. Soc.* 33:136 #7.

Abstracts not listed above:
1923 Expansion theorems for a certain homogeneous integral equation. *Bull. Amer. Math. Soc.* 29:102–03 #3. Presented to a meeting of the AMS, Cambridge, MA, 27–28 Dec 1922. Based on PhD dissertation.
1926 with R. E. Langer. On the theory of integral equations with discontinuous kernels. *Bull. Amer. Math. Soc.* 32:120–21. Presented by R. E. Langer to a meeting of the AMS New York City, 1–2 Jan 1926 #3.

Presentation not listed above:
[Pairman, E.] A new form of the remainder in Newton's interpolation formula. Presented to the Edinburgh Math. Soc., 8 Feb 1918.

References to: MacTutor.
McCallum, Margaret. "Dartmouth Faculty Wife Performs a Unique and Much Appreciated Service." *Hanover (NH) Gazette*, [1959].
"PhD '22, Eleanor Pairman Brown." (Obituary) *Radcliffe Quarterly* (December 1973): 33.

Other sources: Owens questionnaire 1937; application for social security account number 1956; extensive communications with son John Pairman Brown, daughter Margaret B. Schworm, son-in-law Thomas W. Streeter, and granddaughter Deborah Streeter 2002; University of Edinburgh Special Collections; communications with Dartmouth College Archives and with Radcliffe College Archives, Schlesinger Library, Radcliffe Institute (Radcliffe College student files, 1890–1985); "Peccavimus!" *Biometrika* 12 (1919): 266–81; Della Fenster, Deborah Kent, and Thomas Archibald, "A Mobilized Community: Mathematicians in the United States during the First World War" in *The War of Guns and Mathematics*, eds. D. Aubin and C. Goldstein, 229–71 (Providence, AMS: 2014); Scotland Census 1891, 1901; US Census 1930 NH.

Last modified: January 15, 2016.

BUCK, Elsie (McFarland). June 3, 1897–January 11, 1984.
University of California (BA 1917, MA 1918, PhD 1920).

Elsie Jeannette McFarland was born in St. Louis, Missouri, the only child of Lillian (Hope) (b. 1867) and Francis W. McFarland (b. 1863), Missouri natives. They had married in about 1896 and moved by 1900 to San Francisco, California, where Frank McFarland was a clerk in a pension office. In 1910 the family was living in Covina, in southern California, and Francis McFarland was a high school teacher. In 1920 they were in Berkeley and he was a clerk.

Elsie McFarland attended high school in Covina and Pasadena, California, before doing all of her undergraduate and graduate work at the University of California in Berkeley. She was a member of Alpha Phi social sorority as an undergraduate. After graduating in 1917, she began her graduate work and received her master's degree in 1918. She was a university fellow in mathematics 1918–19 and an assistant in mathematics 1919–20 before receiving her doctorate in 1920 with minor subject physics. In September 1920 she presented her dissertation as the first speaker at the university's newly organized women's mathematical honor society, Mu Theta Epsilon.

The next two years McFarland taught mathematics and physics at high schools in California; she was at Maryville High School 1920–21 and at Newman High School 1921–22. During the years 1922–25 McFarland taught as a part-time instructor at three schools in the San Francisco area: the University of California 1922–25, Dominican College in San Rafael 1922–24, and Mills College 1924–25.

In 1925 McFarland moved to the University of Oklahoma as an instructor and was promoted to assistant professor in 1927. She resigned her position at Oklahoma in 1931 for personal reasons. She was living with her parents, who it appears had moved with her to Norman, Oklahoma. She was a visiting PhD at the University of Chicago in the summer of 1931.

McFarland then moved to Spokane, Washington. In November 1980 she reflected on her situation in an interview conducted by Don Haacke for an oral history project at Boise State University. "I was teaching and semi-starving at a very small college in Spokane, known as Spokane University. . . . At any rate, we were not getting paid very much money. I [taught] my whole nine months there for $360 and a box of apples and some kitchen cleanser donated by one of the students as part of his tuition. And I was sending out something like 300 or 400 letters of application all over the country. This was in 1932 . . . when jobs were very few and far between" (p. 1). McFarland then learned that a junior college was to be opened by the Episcopal Church in Boise, Idaho, on the site of St. Margaret's Hall, a school for girls run by the church.

McFarland joined the first faculty of eight at the new Boise Junior College as a teacher of mathematics and German that fall of 1932, at triple her previous salary plus room, board, and laundry. After two years the church withdrew its financial support, and the possibility that the school would close loomed so large that McFarland again sent out applications and accepted a job at Jones County Junior College, a combined agricultural high school and junior college in Ellisville, Mississippi. She was there 1934–37 before accepting an invitation from the new president of the still surviving Boise Junior College to return and teach mathematics and German.

Initially McFarland taught all the mathematics at the school and later was the ranking member in mathematics within the Physical Science Division. Her teaching of veterans after World War II was among the most satisfying of her career. In her November 21, 1980, interview she noted that "except for the first two-year students at the beginning of the junior college, I never had a nicer group of people than the veterans. I had big classes; we might have, maybe, a calculus class of 45 or 50 students, the room packed with them. The nicest, most cooperative people to work with. They knew what they wanted, they'd been out in the war, they were back in school, they knew what they wanted to do" (p. 13). She also served on many college committees including those concerned with scholarship standards, scholarship loans and grants-in-aid, and curriculum.

When McFarland originally moved to Boise, her parents accompanied her. In 1947 she married Roy M. Buck, a civil engineer, who died in 1952. She retired from the college as professor emeritus in 1968, three years after it was granted four-year status and renamed Boise College (now Boise State University). She taught an occasional course after her retirement.

Elsie M. Buck loved music and played clarinet in the college orchestra for many years. She also purchased and played a grand piano in a room in her home built to accommodate it. She and a friend made frequent trips to San Francisco for the opera. She belonged to the faculty women's bridge club for nearly fifty years. She was active in, and served as president of, the Altrusa Club and was a member of the Episcopal church in Boise. She was fond of animals, especially cats; loved to garden; and owned a small cabin outside of Boise where she spent time in the summer.

Elsie McFarland Buck died of heart failure in a Boise, Idaho, hospital at eighty-six in 1984. Services were conducted at All Saints Episcopal Church, and she was buried in Morris Hill Cemetery in Boise. She was survived by two step-children and a cousin. The list of her heirs attests to her devotion to animals, her church, and many close friends.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1918 [McFarland, E. J.] On the general astroid and on the quasi-parallel curve. MA thesis, University of California, Berkeley, directed by John Hector McDonald.

1920 [McFarland, E. J.] On a special quartic curve. PhD dissertation, University of California, Berkeley, directed by John Hector McDonald. Typescript. Printed version, 1923, reprinted from *Univ. California Publ. Math.* 1:389–400.

Publication:

1923 [McFarland, E. J.] A special quartic curve. *Univ. California Publ. Math.* 1:389–400. Published version of PhD dissertation. Reviews: *JFM* 49.0463.03 (E. Löffler); *Rev. semestr. publ. math.* 34, pt. 1:53 (D. J. Struik).

Abstract:

1935 [McFarland, E. J.] A construction for the tangents at the nodes of the rational plane quintic. *Amer. Math. Monthly* 42:411 #4. Presented to the MAA, Pineville, LA, 30 Mar 1935.

References to: AmMSc 4.

Chandler, Eve Brassey. "Ahead of Her Time: A Profile of Dr. Elsie Buck." *Focus Magazine*, Boise State University, 1982.

"Elsie M. Buck." (Obituary) Unidentified newspaper clipping.

Unpublished interview:
Buck, Elsie. Interview by Don Haacke, 21 Nov 1980. "Conversation between Mr. Don Haacke and Dr. Elsie Buck, November 21, 1980, in her home in Boise," OH-20, Special Collections Department, Albertsons Library, Boise State University. Transcript.

Other sources: Owens questionnaire 1940; University of California, Berkeley, Archives; University of Chicago Archives; communications with Boise friends (Helen L. Thomson, Lois Chaffee, Richard Ward, Janet Ward), Boise State University Special Collections, and University of Oklahoma Office of Senior Vice President and Provost; US Census 1900, 1910, 1920 CA, 1930 OK.

Last modified: July 20, 2009.

BURKE, Sister Leonarda. November 24, 1900–March 1, 1998.
Emmanuel College (BA 1926), Boston College (MA 1928), Catholic University of America (PhD 1931).

Ethel Louise Burke was born in Boston, Massachusetts, the daughter of Caroline Dorcas (Leonard) (1860–1934) and James Henry Burke (1857–ca. 1904). Her parents were born in Boston and were educated in the Boston public school system. They were married in about 1883 and probably had five children survive to adulthood of eight born. Of these Ethel was the youngest. Her siblings were sisters, Annie (b. 1890) and Carrie (b. 1893), and brothers, William (b. 1895) and Thomas (b. 1897). Her mother was a housewife, and her father was chief telegrapher for Western Union in Boston before his death in his late forties.

Ethel Burke's primary and secondary education was obtained in Boston public schools. After her high school graduation in 1918, she attended the Boston Normal School for three years, 1918–21, to obtain her certification to teach in the Boston school system. Each summer for six years after her high school graduation she worked as playground instructor for the Boston public schools; the two years after she received her certification she taught in public elementary school in Boston.

In 1923 Burke entered the Congregation of Sisters of Saint Joseph in Boston. A year later Sister Mary Leonarda Burke began a seven-year period of studying for her undergraduate and graduate degrees. Her two years, 1924–26, at Emmanuel College, founded in 1919 as New England's first Catholic college for women, resulted in her bachelor's degree as a mathematics major in 1926. Sister Leonarda earned her master's degree from Boston College by studying part time while also teaching mathematics, French, and history at the secondary level in the Boston diocesan schools. In the first year of her master's work she took courses on weekends; during the second year she took courses after classes finished at her school. Her 1928 thesis had as its topic calculus in high school mathematics.

From 1928 to 1931, Sister Leonarda was in residence at the Catholic University of America, where she studied mathematics, education, and physics. She was among a group of five students, four women religious (Burke, Sr. Mary de Lellis Gough, Sr. Charles Mary Morrison, and Sr. Mary Felice Vaudreuil) and one lay man (James Norman Eastham), who earned their PhD's in 1931 under the direction of Aubrey E. Landry. All five wrote dissertations describing and counting the different types of polygons in-and-circumscribed to a rational quartic curve with variously specified singularities and symmetries.

In the fall of 1931 she began her long association with Regis College, a Catholic college for women in Weston, near Boston, founded by her order and opened just four years earlier. In 1981 Sister Leonarda recalled, "The foresight and aspirations of the foundress of Regis College, Mother Mary Domitilla, C.S.J., motivated and enhanced my involvement in mathematics when she was aspiring to have a strong faculty in the early years, and her efforts provided the departments Latin, History, Greek, French, Mathematics, Biology, Chemistry, etc. in that order" (Smithsonian questionnaire).

Sister Leonarda served at Regis College in a variety of capacities: as teacher, administrator, and as researcher. From 1931 to 1964, as professor of mathematics and chairman of the department, she taught a full complex of courses including work in analysis (calculus, advanced calculus, and numerical analysis); statistics

(descriptive and mathematical); modern algebra and projective geometry (offered as electives during the late 1940s and early 1950s); junior and senior seminars; and computer programming. She engaged in post-doctoral research at Catholic University in the summer of 1940. She also studied modern mathematical techniques in teaching at the University of Chicago in the summer of 1950. From 1963 to 1965 she served as director of the computer center at Regis.

For twenty-five years, 1953–78, Sister Leonarda was director of the Regis College Research Center and principal investigator for contractual work for the Air Force Research Center, Hanscom Field. Her work involved mathematical analysis primarily associated with climatology, meteorology, ionospheric studies, and interplanetary studies. After 1978 she held the title Research Analyst, Institutional Research, at Regis. She also held the rank professor emeritus after her retirement from teaching in 1964.

Sister Leonarda Burke received the Outstanding Educator Award from Regis College in 1975. She was given a special achievement award in acknowledgment of twenty-five years service in support of the research mission of the Geophysics Laboratory of the Air Force on November 15, 1978.

For more than thirty years, Sister Leonarda was a member of the Association of Teachers of Mathematics in New England. From 1958 she made tape recordings for the blind of books from a variety of fields for the Communication Center, Massachusetts Association for the Blind. One project, for example, involved recording the six volumes of Andrew R. Forsyth's *Theory of Differential Equations*.

Sister Leonarda Burke died at age ninety-seven at the Bethany Health Care Center in Framingham, Massachusetts, in 1998. She is buried in St. Patrick Cemetery in Natick.

Organizational affiliations: AMS, MAA, NCTM, Amer. Meteorological Soc., Sigma Xi.

Thesis and dissertation:

1928 Calculus in high school mathematics. MA thesis, Boston College.

1931 On a case of the triangles in-and-circumscribed to a rational quartic curve with a line of symmetry. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC. Review: *JFM* 57.0826.01 (F. Schaale).

Publications:

1941 Two ways of setting up the symmetric correspondence $C_{2,2}$ and a relation connecting them. *Natl. Math. Mag.* 16:29–33.

1950 [Sister Mary Leonarda] Seminar program in mathematics at Regis College. *Amer. Math. Monthly* 57:254–56.

Technical reports:

1958 Return to base of planes under automatic control (predicting problems in field of air traffic control). Contract AF19(604)-2423. US Air Force Cambridge Research Center, Navigation Laboratory.

1973 Upper atmospheric data analysis from data recorded at Thule Air Base, Greenland. Contract F19628-71-C-0172. US Air Force Cambridge Research Laboratories, Bedford, MA.

1974 Meteorological and mathematical analysis. Contract AFCRL-TR-74-0558. US Air Force Cambridge Research Laboratories, Hanscom AFB, MA.

1976 with J. M. Ward, M. R. Hermann, H. J. Pratt, R. M. Glasser. Visibility measurements for probability forecasts, MCIDAS system configuration and capabilities, radiative

change of surface air temperature. Contract AFGL-TR-76-0250. US Air Force Geophysics Laboratory, Hanscom AFB, MA.
1979 Meteorological studies: atmospheric analysis, automated weather system development, satellite studies. Contract AFGL-TR-79-0047. US Air Force Geophysics Laboratory, Hanscom AFB, MA.

References to: AmMWSc 13P, 14–17; LAmSci 7; OutEdAm 1974; WorWhoW 5.

Other sources: PhD dissertation vita 1931; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; Religious Women in Mathematics Survey 1983; communication with Congregation of Sisters of Saint Joseph Archives; US Census 1900, 1920 MA.

Last modified: March 6, 2009.

BUSHEY, Jewell (Hughes). March 13, 1896–May 5, 1989.
University of Arkansas (BA 1915), University of Missouri (MA 1916), University of Chicago (PhD 1924).

Jewell Constance Hughes was the the fifth of six children of Cora A. (Stanley) (b. 1867), originally from Missouri, and James R. Hughes (b. 1862), a native of Indiana. She was born in Fayetteville, Arkansas, where her father was a merchant in 1900, an operator of a sawmill in 1910, and later a timberman and sawmill operator. The other children were Leslie Claire (1887–1971), Verda (1889–1985), Harry (b. 1892), Anna (1894–1975), and Donald (b. 1899).

Jewell Hughes attended public elementary school 1901–08 in Fayetteville and Fayetteville High School 1908–11. She entered the University of Arkansas in 1911 at age fifteen, became a member of Chi Omega social sorority, and graduated in 1915. She immediately received a scholarship at the University of Missouri, where she studied mathematics with E. R. Hedrick, O. D. Kellogg, and Louis Ingold in 1915–16 and received her master's degree in 1916.

Hughes taught for two years at the Columbia, Missouri, high school before returning to the University of Arkansas in 1918 as instructor of mathematics. She remained at Arkansas until 1930: as instructor 1918–24, assistant professor 1924–27, and associate professor 1927–30. She was granted a leave of absence for the academic year 1923–24 for study at the University of Chicago. Hughes studied under E. H. Moore, G. A. Bliss, L. E. Dickson, F. R. Moulton, and Mayme I. Logsdon at Chicago, first in the summer quarters 1920–23 and then in the following four quarters; she was a teaching fellow 1923–24. She wrote her dissertation in the calculus of variations before receiving her PhD magna cum laude in August 1924.

While continuing to teach at the University of Arkansas, Hughes did further study at the University of California in summer 1925 and at the University of Chicago summer 1927. She traveled in Europe in the summer of 1928. Later postdoctoral study included a course at Columbia University during 1934 and work at the University of Chicago in summer 1938.

In 1930 Hughes joined the faculty at Hunter College as assistant professor. She was assured at the time of the offer that she would be promoted to associate professor, her rank at the University of Arkansas, in a short time. An attitude she expressed at a dinner talk at the December 1927 mathematics meetings may partially explain why she left Arkansas. "Miss Jewell Hughes told of the opportunities for women in the teaching of mathematics in the United States, affirming and substantiating the statement that women have an opportunity equal with that of men in college and university positions unless it be in the higher university positions" (*Amer. Math. Monthly* 35 (1928): 103). Hughes remained at Hunter the rest of her career: as assistant professor 1930–39, as associate professor 1939–51, as professor 1951–66, and as professor emeritus after her retirement at age seventy.

On June 24, 1935, Jewell Hughes and Joseph Hobart Bushey, a colleague at Hunter College, were married at the home of her brother, Leslie C. Hughes, in Elizabeth, New Jersey. J. Hobart Bushey (December 19, 1903–November 25, 1976), originally from Baltimore, had received his BS from the Johns Hopkins University in 1924 and his MA and PhD in mathematics from the University of Michigan in 1928 and 1930, respectively. He had also joined the mathematics department at

Hunter College as an assistant professor in 1930. He was promoted to associate professor in 1936 and to professor in 1953. He retired at age seventy.

In 1940 Jewell H. Bushey was elected chairman of the mathematics department at Hunter replacing Lao G. Simons who retired in June of that year. In addition to her teaching and administrative work, Bushey was extremely active in college service and in organizations at the college. She was a member of college committees concerned with the curriculum, with student-faculty relations, with faculty-board relations, and with adult education, among others. During 1943–50 she was chairman of the executive committee of the faculty. For the Hunter chapter of AAUP, she was treasurer part of 1936–37, vice president 1937–38, and president 1938–40. She was also president for several years of the Hunter Phi Beta Kappa chapter and was director at times of the local Pi Mu Epsilon chapter. During the summer of 1959 she directed an NSF institute for junior and senior high school teachers.

Jewell Hughes Bushey was active in a number of professional organizations at the national level, as well. As early as December 1925, when she was an assistant professor at the University of Arkansas, she gave the first of her many dinner speeches at joint meetings of the AMS and MAA. This first speech was a recollection of her recent time as a graduate student at the University of Chicago. A December 1929 speech was described as "replete with wit" (*Amer. Math. Monthly* 37 (1930): 107), while a 1951 speech was "about the past and present status of women mathematicians, stating certain theorems on this subject" (*Amer. Math. Monthly* 59 (1952): 208). The last dinner speech she made that was described in the *Monthly* was forty years after the first; this speech was made on behalf of her fellow charter members of the MAA at the fiftieth anniversary meeting in August 1965. She also spoke at the 1937 luncheon organized by Helen B. Owens that honored women pioneers in mathematical research in America.

Between her first and last speeches, Bushey served the MAA in various ways: she was on several program committees for national meetings, was chairman of the Metropolitan New York Section 1944–45, was national second vice president 1951–52, was governor from the Metropolitan New York Section 1957–60, and was on the committee on secondary school lecturers 1961–63. She was also an advocate for faculty and in 1940 was appointed to an AAUP committee to investigate the dismissal of five faculty members from Adelphi University. She was a member of the AAUP national council 1942–44 and of its executive committee 1942–43. She was a member of a joint committee of AAUP and the Association of American Colleges on tenure and retirement in 1943. She served as a national vice president of the AAUP 1944–46, was a member of the committee on the economic status of the profession 1948, was chairman of the nominating committee for national officers for 1948–50, and was on the board of the *Bulletin* of the AAUP in 1951.

In June 1949 Jewell Bushey was awarded an honorary LLD degree from the University of Arkansas, the second woman to receive that degree from Arkansas. The Jewell Hughes Bushey scholarship for proficiency in mathematics was established by the Hunter College Pi Mu Epsilon chapter the year she retired.

After J. Hobart Bushey retired from Hunter in 1972, the Busheys moved back to Fayetteville, Arkansas. He died four years later, shortly before his seventy-third birthday. Jewell Bushey continued to live in Fayetteville until her death at a local hospital in 1989 at age ninety-three. She was survived by a nephew in New Jersey.

Funeral services were held at St. Paul's Episcopal Church, and she was buried in Fairview Memorial Gardens in Fayetteville.

Organizational affiliations: AMS, MAA (charter member), AAUP, AAUW, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1916 [Hughes, J. C.] Transcendentalism of curves and of numbers. MA thesis, University of Missouri. Typescript.
1924 [Hughes, J. C.] A problem of the calculus of variations in which one end-point is variable on a one parameter family of curves. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series.* 3:31–35.

Publications:
1933 [Hughes, J. C.] Review of *Numerology*, by E. T. Bell. *Scripta Math.* 1:344–45.
1940 Review of *Science in a Tavern*, by C. S. Slichter. *Natl. Math. Mag.* 14:491–92.

Presentation:
Mathematics in the junior colleges. Presented as invited address to the MAA, Nashville, TN, 30 Dec 1927.

References to: AmMSc 5, 7–8, 9P–11P; WhoAmW 3–6.
"Professor Bushey Named." *New York Times*, 11 Jun 1940.
"Hunter Professor Honored." *New York Times*, 4 Jun 1949.
"Mathematics Chairman Is Elevated at Hunter." *New York Times*, 22 Apr 1951.
"Jewell Bushey." (Obituary) *Northwest Arkansas Times*, 6 May 1989.

Related manuscript material:
Jewell C. Hughes Bushey Papers (Manuscript Collection 1064), Special Collections Division, University of Arkansas Libraries, Fayetteville, Arkansas.

Other sources: PhD dissertation vita 1924; Hunter College Archives; communication with University of Arkansas Special Collections; WhoAm 38 (Bushey, Joseph Hobart); US Census 1900, 1910, 1920, 1930 AR, 1930 MI; SSDI.

Last modified: December 8, 2008.

CALKINS, Helen. October 20, 1893–June 17, 1970.
Knox College (BA 1916), Columbia University (MA 1921), Cornell University (PhD 1932).

Helen Calkins was born in Quincy, Illinois, the first of two daughters of Anna Burns (Schermerhorn) (b. 1869) and Addison Niles Calkins (b. 1865), both of Illinois. Her parents married in October 1892. By 1900 her father was superintendent of Electric Wheelworks in Quincy. Her younger sister, Ruth Calkins, was born in 1901 and later attended a business college in Quincy.

Helen Calkins attended Quincy High School 1908–12 and Knox College in Galesburg, Illinois, 1912–16. The year after her 1916 college graduation with special honor in mathematics, she taught mathematics in junior high school in Quincy; the following year she taught mathematics in the senior high school in Jacksonville, Illinois. She then returned to Knox College, where she was instructor in mathematics 1918–20.

Calkins began her graduate work in mathematics as a university scholar at Columbia University in 1920–21. While there she studied history of mathematics and the teaching of mathematics with David Eugene Smith, fundamental concepts with Edward Kasner, and differential equations with W. B. Fite. She received her master's degree at the end of that academic year.

Calkins returned to Knox College as instructor in 1921. She was promoted to assistant professor in 1922 but took a leave of absence from Knox in 1923 to return to Columbia. While at Knox she developed a course in the history of mathematics inspired by her earlier work at Columbia with Smith. She again held a scholarship at Columbia in 1923–24, when she studied Einstein's theory, infinite series, differential equations, modern geometry, and the philosophy of mathematics. She continued her leave from Knox in 1924–25, when she traveled in the United States and Cuba. She attended Columbia part time during 1925–26 and traveled in Europe in the summer and fall of 1926.

In July 1926, in information submitted to the appointments bureau at Columbia, Calkins indicated that she would prefer to be near a good library, that she was a Presbyterian, and that she read and spoke German and Spanish. Calkins served as instructor at the University of Nebraska, substituting for someone on leave of absence, during the second semester 1926–27. By the summer of 1927 she had completed residency requirements for the PhD degree at Columbia.

Calkins was hired at Sweet Briar College for the year 1927–28 as professor of mathematics and acting head of the mathematics department, while Eugenie M. Morenus was on leave in England. Julia Wells Bower also joined the mathematics faculty at Sweet Briar in 1927 and remained the next three years until she left to start her doctoral work at the University of Chicago. Calkins earned a salary of $2800 for the year and paid the college $450 to cover the cost of her room, board and laundry at the college for the academic year. She lived in Professor Morenus's room, which was described by the president of Sweet Briar in a letter of June 27, 1927, as "a very attractive front room in one of the faculty houses, in which the dining-room is situated where about eighteen members of the faculty have their meals" (Faculty Files, Sweet Briar College Archives). There were also arrangements for her small coupe.

On Janurary 17, 1930, the president of Sweet Briar summarized the quality of Calkins' work to a Chicago teacher's agency. "We were so much impressed with Miss Calkins' ability that it was with deep regret that we allowed her to leave. There is a lucidity of mind, an ability to present any matter with which she is dealing, a gentleness and charm of personality, and an all-round sanity that will go far in academic usefulness" (Faculty Files, Sweet Briar College Archives).

In the summer of 1928 Calkins enrolled at Cornell and took classes through the summer of 1930 as a scholarship holder. Her intended advisor, Charles F. Roos, left Cornell for the AAAS in 1930, at the same time that Calkins took a job as professor and acting head of the department of Pennsylvania College for Women in Pittsburgh. In May 1931 Roos was asked to stay on as her advisor, and he agreed to do so as long as someone else at Cornell assumed joint responsibility with him. On May 20, 1931, he wrote to F. K. Richtmyer, the dean of the graduate school, that Calkins was "working on a problem of maximizing a functional not of the ordinary calculus of variations type" and suggested David Clinton Gillespie as the person to be the official advisor since Calkins had taken a course in calculus of variations from him (Box 69 C-1-C-5-C, Graduate School Records, Division of Rare and Manuscript Collections, Cornell University Library). Roos then described some aspects of her progress and wrote, "I think that Miss Calkins' thesis is of unusual interest." In her dissertation, which was approved in October 1931, she acknowledges both Roos and Wallie Abraham Hurwitz, whom she later listed as a personal friend; the degree was awarded in February 1932.

Except for brief periods, Calkins spent the remainder of her career as professor and head of the department at Pennsylvania College for Women, where she was usually the only member of the mathematics department. It appears that upon her arrival she initiated a student mathematics club known as Beta Chi, which existed during most of her first decade there. She served on a number of standing faculty committees, especially those on the curriculum and the library. She also served on the advisory board. During the summer of 1941, Calkins worked as a statistician in engineering defense training at Pennsylvania State College. She spent 1943–44 at the University of Minnesota, where she taught mathematics to pre-flight cadets. During the 1930s and 1940s Calkins consistently attended meetings of the Allegheny Section of the MAA. After having been on leave the year 1956–57, Calkins retired as professor emeritus in 1957, two years after the school changed its name to Chatham College (now University).

Calkins was a member of Delta Delta Delta social sorority; Pi Lambda Theta, an education honor and professional association; the College Club of Pittsburgh; and the Daughters of the American Revolution. After her retirement, she moved back to Quincy, Illinois, where she was a member of the Quincy country club and the First United Presbyterian Church.

Helen Calkins died at age seventy-six in 1970 of arteriosclerotic heart disease at the Good Samaritan Home in Quincy, Illinois, where she had resided for about four years. She was survived by her sister and was entombed in the Woodland Mausoleum in Quincy.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, AAUP, Pi Mu Epsilon.

Thesis and dissertation:

1921 The unity in mathematics, as illustrated by a certain differential equation. Master's thesis, Columbia University.

1931 Some implicit functional theorems. PhD dissertation, Cornell University, directed by Charles Frederick Roos (at AAAS from 1930) and David Clinton Gillespie (from 1931). Typescript. PhD granted 1932. Abstract: Ithaca, NY, 1932.

Abstract:

1935 Some implicit functional theorems. *Amer. Math. Monthly* 42:591 #4. Presented to the MAA, Bethany, WV, 4 May 1935.

References to: AmMSc 6–8, 9P–11P.

"Miss Helen Calkins." (Obituary) *Quincy Herald Whig*, 18 Jun 1970.

Other sources: PhD dissertation vita 1931; Owens questionnaire 1940; Columbia University Rare Book and Manuscript Collection; Division of Rare and Manuscript Collections, Cornell University Library; communications with Chatham College Library, Knox College Archives, Quincy Public Library, and Sweet Briar College Archives; US Census 1900, 1910, 1920, 1930 IL; Illinois death certificate; SSDI.

Last modified: July 19, 2009.

CARLSON, Elizabeth. October 2, 1896–November 1, 2000.
University of Minnesota (BA 1917, MA 1918, PhD 1924).

Sally Elizabeth Carlson was born in Minneapolis, Minnesota, the third of five surviving children of six born to Alice (Alise) (Johnson) (1870–1956) and Carl Emil Carlson (1858–1950). Both of her parents were born in Sweden and emigrated several years before their marriage in 1891. Her mother had an elementary school education, and her father had no formal education, although he was literate in Swedish and English. He was a stone mason in Minneapolis. Her eldest brother, Oscar E. (1892–1958), was a salesman, having had some high school and business college, while her next oldest brother, A. Paul (1894–1973), was an electrical engineer with a BS in engineering. Her sister, Esther A. (1904–1975), with a high school and Bible school education, served forty-six years as a missionary to Venezuela, and her youngest brother, Clifford N. (1907–1939), was a lawyer.

In 1913 Carlson graduated as valedictorian from South High School in Minneapolis and remained in that city for her collegiate and most of her professional career at the University of Minnesota. Even though her parents were not supportive of her desire for a college education, she received her bachelor's degree in 1917 and her master's degree in 1918, after which she taught at McIntosh High School in northern Minnesota for nine months. She was an instructor of mathematics and physics at Knox College in Illinois during 1919–20. Carlson returned to the University of Minnesota in 1920 where she was a teaching assistant in mathematics her first year and remained an assistant until she received her PhD four years later. She and Carey Morgan Jensen (a male) received the first two PhD's in mathematics at Minnesota in 1924, both as students of Dunham Jackson in analysis and both with minors in physics.

Elizabeth Carlson remained at Minnesota until her retirement as professor emeritus in June 1965. She was instructor 1924–28, assistant professor 1928–50, associate professor 1950–63, and professor 1963–65, a pattern very similar to that of Gladys Gibbens, her slightly older colleague. Carlson taught at Hunter College in the summer session of 1930, having exchanged positions with a faculty member from there. In the fall of 1965, just after her retirement, she taught at Macalaster College as a visiting professor. During her career at Minnesota she taught elementary and advanced undergraduate courses, was advisor for a number of MA candidates, and won a Distinguished Teacher Award in 1962. In the late 1930s, she joined with Raymond W. Brink and Ella Thorp, who together had earlier published a book of exercises for trigonometry, in producing a set of exercises for Minnesota's intermediate algebra course. She also taught a reading course for advanced mathematics students during the summers, sometimes with other faculty and sometimes alone.

Carlson published three papers based on her dissertation, two in the *Transactions* of the AMS and one in the *Bulletin* of the AMS. Two decades after she retired, she wrote that she "considered being a good teacher more important than any mathematical research [she] might do" (Smithsonian questionnaire 1985). She was active in the mathematical community through the early 1960s; she was an associate editor of the *American Mathematical Monthly* 1927–31, served on the executive committee of the Minnesota Section of the MAA 1961–62, and refereed for the *Monthly* in 1962.

Carlson was an active member of the Evangelical Free Church of America and helped start the Central Evangelical Free Church in downtown Minneapolis. She taught Sunday school, was deaconess, and sang in the choir and in a mixed quartet at the Central Evangelical Free Church, which is now closed. She served as faculty advisor for the Minnesota Christian Fellowship and for the Inter-Varsity Christian Fellowship chapter at the University of Minnesota and was active in the faculty Bible class. She also conducted Bible studies in her home and elsewhere, especially after her retirement. Carlson traveled extensively throughout the world and retained her fluency in Swedish.

Warren Loud, a former colleague of Carlson, reported to one of the authors in an e-mail message on March 3, 1998, that "she was strong and vigorous right up to retirement and beyond. As an undergraduate she lived about three miles from campus and always walked both ways every day, (not an easy thing in a Minneapolis winter!) although when I knew her, she drove to and from the university. I recall meeting her in downtown Minneapolis in 1984, when she was eighty-eight. She said she was doing an errand for one of the older ladies in her retirement home."

Elizabeth Carlson died at the Augustana Home of Minneapolis at age 104 in November 2000. The following fall the mathematics library at the University of Minnesota mounted an exhibit, "Elizabeth Carlson, notable alumna."

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Dissertation:

1924 On the convergence of certain methods of closest approximation. PhD dissertation, University of Minnesota, directed by Dunham Jackson. Printed version, 1926, Lancaster, PA, reprinted from *Trans. Amer. Math. Soc.* 26:230–40, *Trans. Amer. Math. Soc.* 28:435–47, and *Bull. Amer. Math. Soc.* 32:639–41.

Publications:

1924 Extension of Bernstein's theorem to Sturm-Liouville sums. *Trans. Amer. Math. Soc.* 26:230–40. Part one of published version of PhD dissertation. Reviews: *JFM* 50.0314.01 (E. Hille); *Rev. semestr. publ. math.* 32, pt. 1: 14 (P. Mulder). Presented by title to the AMS, Rochester, NY, 7 Sep 1922; abstract: *Bull. Amer. Math. Soc.* 28:381–82 #12.

1926a On the convergence of certain methods of closest approximation. *Trans. Amer. Math. Soc.* 28:435–47. Part two of published version of PhD dissertation. Reviews: *JFM* 52.0456.01 (H. Grunsky); *Rev. semestr. publ. math.* 33, pt. 2: 20 (P. Mulder). Presented to the AMS, Chicago, 19 Apr 1924; abstract: *Bull. Amer. Math. Soc.* 30:396 #12.

1926b On the convergence of trigonometric approximations for a function of two variables. *Bull. Amer. Math. Soc.* 32:639–41. Part three of published version of PhD dissertation. Reviews: *JFM* 52.0275.04 (H. Grunsky); *Rev. semestr. publ. math.* 33, pt. 2: 7 (D. J. Korteweg). Presented as "On the approximate representation of periodic functions of two variables" by Prof. Jackson to the AMS, Chicago, 14 Apr 1922; abstract: *Bull. Amer. Math. Soc.* 28:290 #8.

Abstracts not listed above:

1922 An analytic geometry treatment of the nature of conics generated by projective ranges and pencils. *Amer. Math. Monthly* 29:239 #4. Presented to the MAA, St. Paul, MN, 27 May 1922.

1928 A simplified proof for the extension of Bernstein's theorem to Sturm-Liouville sums. *Bull. Amer. Math. Soc.* 34:416 #42. Presented by title to the AMS, Chicago, 7 Apr 1928.

1929 Teaching higher algebra in large classes. *Amer. Math. Monthly* 36:414 #6. Presented to the MAA, St. Paul, MN, 11 May 1929.

1936 A course in synthetic metric geometry. *Amer. Math. Monthly* 43:596 #5. Presented to the MAA, St. Peter, MN, 16 May 1936.

References to: AmMSc 4–8, 9P–11; AmWom 1935–40; BiDWSci.
"Sally Elizabeth Carlson, 100th Birthday Celebration, October 5, 1996." Privately printed program.
Her, Lucy Y. "Former 'U' Math Prof. Sally Elizabeth Carlson Dies at Age 104," *Minneapolis Star Tribune*, 3 Nov 2000.

Other sources: PhD dissertation vita 1924; Owens questionnaire 1940; Smithsonian questionnaire 1985; University of Minnesota mathematics department; communications with Warren Loud, former colleague, and with University of Minnesota Archives; US Census 1910, 1920, 1930 MN.

Last modified: June 23, 2011.

CASNER, Evelyn (Wiggin). March 1, 1900–November 5, 1964.
Wellesley College (BA 1921), Brown University (MA 1924), University of Chicago (PhD 1936).

Evelyn Prescott Wiggin was born in Stratham, New Hampshire, the elder of two daughters of New Hampshire natives Margaret Prescott (Green) (1871–1905) and George Herbert Wiggin (1864–1948), a farmer. Her parents, neither of whom had attended college, married on December 30, 1896, and her mother died three days after giving birth to their second daughter, Elsie [or Elise] Green Wiggin, in September 1905. Her father remarried in 1908.

Evelyn Wiggin received her early education at Robinson Seminary, a public secondary school in Exeter, New Hampshire, before entering Wellesley College in 1917. While at Wellesley she was a Durant scholar. After her graduation as a mathematics major in 1921, she taught mathematics at the high school in Massena, New York, during 1921–22.

On March 28, 1922, Wiggin received a letter from R. G. D. Richardson at Brown University, who, at the suggestion of "my good friends, Misses [Helen A.] Merrill and [Clara E.] Smith at Wellesley," invited her to apply for a position as a graduate assistant in the department at Brown University (Correspondence 1921–1925, R. G. D. Richardson Papers, Brown University Archives). He wanted someone to assist him half time and indicated that there was also the opportunity to study toward the MA degree. He noted that there were usually four or five students studying for master's degrees each year, half of whom were women – chiefly from Women's College, Brown. Wiggin entered Brown in 1922 and was to serve as Richardson's assistant, which involved reading papers and keeping department records; she also was to teach a section of students who had entered with only one year of algebra. In addition, for an extra stipend, she was to teach a class of girls deficient in algebra during the first semester and those deficient in plane geometry during the second semester. Two years later, in 1924, she completed her master's degree having taken work mainly with Richardson and Raymond Clare Archibald.

Wiggin was an instructor of mathematics at Hood College in Frederick, Maryland, from September 1924 until June 1927. On October 16, 1924, in reply to a note from her, Richardson wrote, "I know that you will not forget the intellectual ideal which inspired you to go on with graduate work" (Richardson Correspondence 1921–1925). Richardson continued to encourage Wiggin to pursue the study of mathematics. On October 9, 1925, after she reported to him on extra duties at Hood because of illness of a colleague's mother, duties that resulted in twenty-one hours of teaching and looking after the department, he wrote, "If you care to take some course for credit *in absentia* here at Brown, I think it could be arranged. I know you will want to keep on with your studies in some sort of way. Possibly you can go to Chicago some summer" (Richardson Correspondence 1921–1925). Wiggin left Hood College in 1927 to enter the University of Chicago for further graduate work. She was first there for two years, as a teaching fellow in her second year, 1928–29, working mainly with Gilbert Ames Bliss.

In 1929 Wiggin joined the faculty of Randolph-Macon Woman's College in Lynchburg, Virginia, as an associate professor. (The college was renamed Randolph College and became coeducational in 2007.) Except for leaves she remained at

Randolph-Macon the rest of her career. Gillie Larew was also on the faculty, although in Wiggin's first year there, Larew was on leave to study with Carathéodory in Munich. In a letter to Bliss of March 31, 1931, Larew commented about Wiggin: "I want to thank you again for sending us Miss Wiggin and express the hope that we may keep her for a long, long time. She is everything she should be both as teacher and as a person. We have managed to do a little reading together and hope to do more, when she has her thesis and examination off her hands . . . " (University of Chicago. Department of Mathematics. Records, Box 1, Folder 8, Special Collections Research Center, University of Chicago Library). Wiggin returned to the University of Chicago and was in residence 1935–36 when she finished her dissertation in the calculus of variations; she was awarded the PhD in 1936. She returned to Randolph-Macon and then was promoted to full professor in 1941.

Wiggin was on leave and was a lecturer at Wellesley College during 1942–43 and taught at Emory University in summer 1949. In December of 1951 she attended a computing laboratory seminar at the Oak Ridge Institute of Nuclear Studies. In the summer of 1953 she attended the first of the recently founded (1950) National Science Foundation's summer institutes in mathematics, this held at the University of Colorado for college teachers. The following summer she attended another NSF institute at the University of North Carolina. During 1954–55 she was on leave and studied at the University of Chicago.

On June 20, 1956, Evelyn Wiggin married Sidney Casner, a retired lawyer, in Chicago. Casner was born in 1890, grew up in Chicago, had degrees from the University of Illinois and Kent College of Law, and attended the University of Chicago Law School. He had practiced law and taught social sciences in Hyde Park High School in Chicago. He also had taught in the DePaul University College of Law and the Kent College of Law in Chicago. From July 1945 to August 1947, he was in Europe, where he served as a military judge and taught at army university centers in England, France, and Germany. According to a 1966 graduate of Randolph-Macon, Sidney Casner had died by September 1962.

After her marriage, Evelyn Wiggin Casner continued in her position at Randolph-Macon. For eight weeks during the summer of 1957, she was at Stanford on a grant from the Social Sciences Research Council studying applications of mathematics to the social sciences. Based on this work she developed an experimental course for social science students at Randolph-Macon. During the late 1950s and early 1960s she taught in seven NSF summer institutes for high school teachers.

Although Casner was reportedly a very shy person, she held leadership positions in various organizations on campus and in Lynchburg. For example, she was president of the college faculty club and local chapters of Sigma Xi and AAUP. She was also exceedingly active in the community. Soon after her arrival in Virginia, she was president of the Lynchburg Consumer Cooperative 1932–40. She was involved with the YWCA, and over many years served as president (1958–62), trail supervisor, and council member of the local Appalachian Trail Club. She was also a member of the Virginia Academy of Science.

Evelyn Wiggin Casner died in Charlottesville, Virginia, at age sixty-four in 1964. The Evelyn Casner Memorial Award was established by the Natural Bridge Appalachian Trail Club to be presented to the club member who logged the most miles during a year on hikes scheduled by the club.

Organizational affiliations: AMS, MAA, NCTM, AAAS, Sigma Delta Epsilon, AAUW, AAUP, Phi Beta Kappa.

Dissertation:

1936 [Wiggin, E. P.] A boundary value problem of the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss and William Thomas Reid. Typescript. Private edition, 1937, distributed by the University of Chicago Libraries, reprinted from *Contributions to the Calculus of Variations, 1933–37*, 243–75.

Publications:

1937 [Wiggin, E. P.] A boundary value problem of the calculus of variations. In *Contributions to the Calculus of Variations, 1933–37*, 243–75. Chicago: University of Chicago Press. Published version of PhD dissertation. Reviews: *JFM* 63.0483.03 (H. Boerner); *Zbl* 017.36203 (L. M. Graves). Review of volume: *Bull. Amer. Math. Soc.* 44:604–09 (A. Dresden).

1945 [Wiggin, E.] The value of mathematics in a liberal education. *Math. Mag.* 19:418.

References to: AmMSc 5–8, 9P–11P; AmWom 1935–40; WhoAmW 3.
Obituary. *Lynchburg News*, 6 Nov 1964.

Other sources: PhD dissertation vita 1936; Owens questionnaires 1937, 1940; Brown University Archives (R. G. D. Richardson Papers); Special Collections Research Center, University of Chicago Library (Department of Mathematics, Records); Wellesley College Alumnae Office; Wiggin Memorial Library, Stratham, NH; communication with Carol Wood, student at Randolph-Macon 1962–66; "The Virginia Hiker: Natural Bridge Appalachian Trail Club: 1930–1990"; US Census 1900, 1920, 1930 NH, 1930 IL.

Last modified: January 15, 2016.

CHANLER, Josephine H. April 7, 1906–December 23, 1992.
Western Kentucky State Normal School and Teachers College (BA 1927), University of Illinois (MA 1930, PhD 1933).

Josephine Hughes Chanler was the only child of Louisa Castle (Hughes) (1869–1948) and James H. Chanler. Although she was born in St. Louis, she and her mother were there only briefly, staying in a friend's apartment while her father was away looking for timber for a lumber company. A few weeks after Josephine's birth, she and her mother returned to Bowling Green, Kentucky, where her mother's family lived. Her father was away from the family after that time, although her parents corresponded until about 1918.

Josephine Chanler's mother had begun teaching at age eighteen and had attended, but not received a degree from, Pleasant J. Potter College, a college for women with preparatory and degree programs in Bowling Green that was chartered in 1890. Her mother taught in grade school and then in high school in nearby Franklin, Kentucky, so Josephine and her mother typically lived in Franklin in the winters and in Bowling Green in the summers.

Josephine Chanler contracted polio as a child and had surgery at various times in her life as a consequence. She attended schools in both Franklin and Bowling Green. She noted later that she started high school at age eleven in Franklin. At about this time her mother was teaching history in a small college there, but was unable to return to her job after an illness and surgery. Josephine Chanler then attended a half year of high school in Bowling Green, before she and her mother went to Jacksonville, Florida, to stay with family; she graduated in 1923, at age seventeen, from Duval High School in Jacksonville.

Chanler credited her grandfather with starting to teach her mathematics at an early age and her mother with encouraging her to go to college and later to do graduate work. Thus, after her high school education they returned to Bowling Green where she entered Western Kentucky State Normal School and Teachers College (now Western Kentucky University). The college had awarded its first degree (baccalaureate) in 1924. Chanler noted later that her tuition at Western Kentucky was ten dollars a semester. She graduated in 1927 and that summer published a poem in a journal of the Kentucky Folk-Lore Society. Immediately after her graduation, she taught mathematics for two years in the high school in Bowling Green.

Chanler's mother mortgaged the house she had inherited in Bowling Green, and they moved to Illinois in 1929 so Josephine Chanler could begin her graduate work at the University of Illinois. She was unable to get an assistantship the first year since her undergraduate degree was not from a fully accredited school. However, she earned her master's degree in 1930 with a thesis written under the direction of Bessie Irving Miller, who had earned her PhD at Johns Hopkins University in 1914, one of the first two doctoral students of Arthur B. Coble. Coble, who was to become Chanler's doctoral dissertation advisor, had come to Illinois as professor in 1918, while Miller had come as an instructor in 1928 after heading the mathematics department at Rockford College in Illinois. Miller died suddenly a few months after Chanler received her master's degree. Chanler remained at Illinois and was a fellow in mathematics 1930–31 and then an assistant in mathematics while finishing the work for her doctorate in 1933 with a minor in physics. In the six years after she received her PhD, Chanler published five papers in algebraic geometry.

Chanler remained at Illinois for the rest of her career, although she had an opportunity to take a position as assistant professor at a women's college in New England in the mid-1930s. She was assistant until 1937, instructor 1937–39, associate 1939–45, assistant professor 1945–61, and associate professor 1961–71. When Coble was on leave, Chanler was the dissertation director of one doctoral student, Franz E. Hohn, who received his PhD in algebraic geometry in 1941. Chanler was described by a former colleague, P. W. Ketchum, in 1983 as a "very fine teacher." He also noted that she had many "subadministrative" jobs in the department.

In the summers during World War II, Chanler taught in programs for servicemen. During the summers of 1959 through 1970 she was an instructor at National Science Foundation institutes for high school teachers at Saint Louis University. In 1968 she was among four University of Illinois faculty members to record a memorial tribute to her advisor and colleague, Arthur Byron Coble. The tribute was reproduced in the *Bulletin* of the AMS in 1970 (76:693–94).

Josephine Chanler and her mother lived together until her mother's death in 1948. They shared an apartment for a year with Echo Pepper after Pepper's apartment mate, Bessie I. Miller, died. Pepper had joined the faculty at the University of Illinois in 1928 as an instructor. Beulah Armstrong, who had earned her PhD at Illinois twelve years before Chanler, was Chanler's office mate for twenty years. After the death of Chanler's mother, Armstrong, who loved to drive, took Chanler on trips nearly every summer; they camped in the West and went to various summer mathematics meetings. Olive C. Hazlett was also a colleague for several years.

Chanler was a staunch Democrat and was a member of Toastmasters International. Her religious interests were serious and eclectic; in about 1940 she listed her religion as Presbyterian; in a 1983 conversation with the author and Uta C. Merzbach, she described herself as "a Southern Presbyterian–Calvinist–Catholic with leanings toward Judaism and Islam and a very high regard for Buddhism, Mormons, and some Hindu gods." An obituary noted that she was a member of St. Mary Catholic Church.

Chanler maintained an apartment in Champaign for many years after her retirement. There she kept in touch with numerous former students and tutored without charge countless students in mathematics. She was in a health care facility for about five years before her death in Urbana at age eighty-six in 1992. She is buried in Mount Hope Cemetery in Urbana.

Organizational affiliations: AMS, MAA, NCTM, Sigma Delta Epsilon, AAUP, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1930 Polar reciprocation with respect to conics [and quartics]. MA thesis, University of Illinois, directed by Bessie Irving Miller. (Title based on Chanler's recollection.)

1933 Poristic double binary forms. PhD dissertation, University of Illinois, directed by Arthur Byron Coble. Printed version, 1934, Baltimore, MD, reprinted from *Amer. J. Math.* 56:529–46.

Publications:

1927 The spirit of the cross. *Kentucky Folk-Lore and Poetry Mag.* 2 no. 2.

1934 Poristic double binary forms. *Amer. J. Math.* 56:529–46. Published version of PhD dissertation. Reviews: *JFM* 60.0076.03 (R. Weitzenböck); *Zbl* 010.12605 (E. G. Togliatti).

1935 with A. B. Coble. The geometry of the Weddle manifold W_p. *Amer. J. Math.* 57:183–218. Reviews: *JFM* 61.0712.03 (E. A. Weiss); *Zbl* 011.26904 (E. G. Togliatti).

1937 The involution curve determined from a special pencil of n-ics. *Trans. Amer. Math. Soc.* 42:1–15. Reviews: *JFM* 63.0636.03 (E. A. Weiss); *Zbl* 017.03003 (E. G. Togliatti). Presented by title to the AMS, Durham, NC, 31 Dec 1936; abstract: *Bull. Amer. Math. Soc.* 43 (1, pt. 1): 40–41 #81.
1938 with R. M. Thrall. Ternary trilinear forms in the field of complex numbers. *Duke Math. J.* 4:678–90. Reviews: *JFM* 64.0052.01 (R. Weitzenböck); *Zbl* 020.06105 (B. L. van der Waerden). Presented by title to the AMS, State College, PA, 10 Sep 1937; abstract: *Bull. Amer. Math. Soc.* 43:626 #362.
1939 The invariant theory of the ternary trilinear form. *Duke Math. J.* 5:552–66. Reviews: *JFM* 65.0665.03 (R. Weitzenböck); *MR* 1,35e (H. W. Turnbull); *Zbl* 022.07505 (E. A. Weiss).
1964 Review of *Modern Mathematics for the Engineer*, ed. E. F. Beckenbach. *Pi Mu Epsilon J.* 4:22.
1969 Review of *Modern Projective Geometry*, by R. J. Bumcrot. *Amer. Math. Monthly* 76:1168–69.

Abstract not listed above:
1938 Some interesting problems in the study of porisms. *Amer. Math. Monthly* 45:402–03 #6. Presented to a meeting of the MAA, Carbondale, IL, 13–14 May 1938.

Presentation not listed above:
Topics in geometry. Presented to the NCTM, St. Louis, MO, 14 Mar 1969.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P; AmWom 1935–40.
"Josephine Chanler." (Obituary) *Champaign-Urbana News-Gazette*, 24 Dec 1992.

Other sources: PhD dissertation vita 1933; Owens questionnaires 1937, 1940; Josephine Chanler, conversations with author, 1 Oct 1981, and with author and Uta C. Merzbach, 24 Mar 1983; P. W. Ketchum, conversation with author and Uta C. Merzbach, 23 Mar 1983, Urbana, IL; Urbana Free Library.

Last modified: March 6, 2009.

COHEN, Teresa. February 14, 1892–August 10, 1992.
Goucher College (BA 1912), Johns Hopkins University (MA 1915, PhD 1918).

Teresa Cohen was born in Baltimore, Maryland, the daughter of Rebecca (Sinsheimer) (b. 1856) and Benjamin Cohen (b. 1855), natives of Maryland. She was the eldest of four children; her younger siblings were Simon (1894–1977), Martha (1896–1978), and Hilda (1898–2000). Her father was a wholesale shoe merchant.

Cohen graduated from Friends School in Baltimore in 1909 before entering Goucher College from which she graduated in 1912 as a member of Phi Beta Kappa. Her two sisters also graduated from Goucher; Martha became a social worker, and Hilda became an attorney. Her brother, Simon, studied at the Johns Hopkins University and received his bachelor's degree from the University of Cincinnati. He then was ordained a rabbi by, and later received a Doctor of Divinity degree from, Hebrew Union College in Cincinnati; he spent most of his career engaged in academic work.

In 1912 Teresa Cohen entered Johns Hopkins with a resident fellowship for the year 1912–13. After she received her master's degree in 1915, she was made a university scholar at Johns Hopkins for the year 1915–16 and was a fellow 1917–18. In her dissertation she thanks not only her advisor, Frank Morley, but also A. B. Coble, Abraham Cohen, and two of her teachers at Goucher, Clara L. Bacon and Florence P. Lewis. Her minor subjects were physical chemistry and chemistry.

After receiving her PhD in 1918, Cohen went to the University of Illinois for the year 1918–19 as an instructor. She also taught courses at Johns Hopkins during the summers of 1918, 1919, and 1920. In the fall of 1920, the chairman of Pennsylvania State College (now University) found himself in need of another instructor and remembered that Abraham Cohen, Teresa Cohen's uncle and one of his former teachers at Johns Hopkins, had mentioned that his niece was available for employment. Thus, in September 1920 Teresa Cohen became the first woman on the mathematics faculty at Penn State. She said in a 1979 interview, "I used to stay out of the way and hope that if I wasn't a nuisance they'd get some more women" (Hale). Over the years a number of women joined Cohen and stayed at Penn State; these include Aline Huke Frink, Beatrice Hagen, and Helen Owens. In the late 1930s, Owens, who was not yet on the faculty because she was the wife of the chairman of the department, formed the Committee for Study of Women's Work in Mathematics, for which Cohen served as chairman. That committee arranged a luncheon honoring early American women mathematicians at the mathematics meetings held in State College in September 1937. Also at those meetings, Cohen performed a violin sonatina at a concert held one evening.

Cohen remained on the faculty of Penn State until she was forced to retire at age seventy. She was promoted to assistant professor in 1921, to associate professor in 1938, and to professor in 1945. In 1956 the department published notes on "Basic Algebra and Trigonometry" that she had written with two colleagues, Walter J. Harrington and Frank Kocher.

After her retirement, Cohen held the title professor emeritus, taught some classes, and worked as an unpaid volunteer, tutoring students who had problems with mathematics. She continued to tutor on a regular basis for twenty-four years until a serious accident in early 1986 prevented her from doing so. A car lost its brakes and pinned her against her house causing her severe damage from which she never

completely recovered. After several months in the hospital and in rehabilitation in Pennsylvania, her family moved her to a nursing home in Pikesville, Maryland, where she lived until her final illness.

Both before and after the accident, Cohen was recognized for her contributions to Penn State and its mathematics department. In November 1979, the alumni association of the Lion's Paw Senior Honor Society, a group that recognizes student leaders at Penn State, presented Cohen with its Lion's Paw Medal for extraordinary service to the university. In 1982 the department created the Teresa Cohen Service Award, which is presented biannually on, or close to, Cohen's Valentine's Day birthdate; the award is given to one faculty member at the main campus and another at one of the other campuses in the university system. After Cohen's accident, her niece and nephew contributed to the establishment in 1987 of the Teresa Cohen Tutorial Endowment Fund in the mathematics department. In 1991, a year before Cohen's death, the department established the Sperling-Cohen tutoring program for first-year calculus that bears her name along with that of a 1936 alumnus who contributed generously to the department's tutoring program. The head of the department in 1992, Jerry Bona, said "One of her greatest gifts to us was that she showed us what to do and how to do it. We are merely following her example" (Ferguson 1992).

Cohen was active in Sigma Delta Epsilon (now Sigma Delta Epsilon/Graduate Women in Science) and was national treasurer from 1954 until 1963, a year after her retirement from teaching. At the time of her retirement, the *Sigma Delta Epsilon News* reported that "one of her great loves is music and she goes to as many concerts as she can. She plays the violin and continues to take lessons during summer vacations. She says, 'I am not much of a player, but I do have a lot of fun.'" She started her violin lessons at age ten and continued them until age eighty-five. She spent her summers at a home in the Baltimore area that she maintained at least through 1979, when she remarked that "Pennsylvania is like a family you're married into but Maryland is kinfolks" (Hale).

Teresa Cohen died of pneumonia at Sinai Hospital in Baltimore, Maryland, in 1992, almost six months after celebrating her one hundredth birthday. She is buried at the Oheb Shalom Cemetery in Baltimore. She was survived by her youngest sister, a nephew and two nieces, as well as grandnieces, grandnephews, great-grandnieces, and great-grandnephews.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Delta Epsilon.

Thesis and dissertation:

1915 Preliminaries to the obtaining of the conic determined by a line ξ and the four tangents at its intersections with a plane quartic. MA thesis, Johns Hopkins University. Handwritten.

1918 Investigations on the plane quartic. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Handwritten. Printed version, 1919, Baltimore, MD, reprinted from *Amer. J. Math.* 41:191–211.

Publications:

1916 The asymptotic equation and satellite conic of the plane quartic. *Amer. J. Math.* 38:325–36. Reviews: *JFM* 46.0155.02 (F. Gonseth); *JFM* 46.0953.02 (W. Fr. Meyer); *Rev. semestr. publ. math.* 25, pt. 1: 6 (E. B. Cowley).

1917a The Cayleyan curve of the quartic. *Proc. Nat. Acad. Sci. U.S.A.* 3:447–50. Review: *Rev. semestr. publ. math.* 26, pt. 2: 7 (D. J. Korteweg).

1917b A comitant curve of the plane quartic. *Amer. J. Math.* 39:221–32. Reviews: *JFM* 46.0953.03 (W. Fr. Meyer); *Rev. semestr. publ. math.* 26, pt. 1: 1 (E. B. Cowley). Presented as "On a concomitant curve of the planar quartic" to the AMS, New York City, 28 Dec 1916; abstract: *Bull. Amer. Math. Soc.* 23:272–73 #29.
1919 Investigations on the plane quartic. *Amer. J. Math.* 41:191–211. Published version of PhD dissertation. Reviews: *JFM* 47.0604.02 (W. Fr. Meyer); *Rev. semestr. publ. math.* 28, pt. 1: 1–2 (E. B. Cowley).
1956 with W. J. Harrington and F. Kocher. *Basic Algebra and Trigonometry.* University Park: Department of Mathematics, Pennsylvania State University.
1979 with W. J. Knight. Convergence and divergence of $\sum_{n=1}^{\infty} 1/n^p$. *Math. Mag.* 52:178.

Abstract not listed above:
1920 The representation of fractions of periods on algebraic curves by means of virtual point sets. *Bull. Amer. Math. Soc.* 26:258 #35. Presented to a meeting of the AMS, New York City, 30–31 Dec 1919.

References to: BioWMath.
"SDE Features Dr. Teresa Cohen." *Sigma Delta Epsilon News*, May 1962.
"One of First Woman Math Professors Is Student in Retirement." *Williamsport* (*PA*) *Sun-Gazette*, 27 Apr 1966.
Hale, Barbara. "Matriarch of Mathematics: Teresa Cohen – Still Calculating at 86!" *Penn Stater*, Jan/Feb 1976, 1.
"The Good Old Days Remember When ... with Dr. Teresa Cohen, Professor Emerita of Mathematics." *Science News* (Pennsylvania State University), #6, Fall 1977.
"At 86, Dr. Cohen Still Works Daily Tutoring Students." *Penn State Intercom*, 9 Nov 1978.
Ferguson, Janice M. "Teresa Cohen's Legacy." *Science Journal* (Penn State Eberly College of Science Alumni Society) 19, Spring 1992, 9.
"Teresa Cohen Math Professor." (Obituary) *Baltimore Sun*, 12 Aug 1992.
"Teresa Cohen, Pioneer Female in Math." (Obituary) *Harrisburg* (*PA*) *Evening News*, 14 Aug 1992.

Related manuscript materials:
Teresa Cohen Papers, 1928–1986. University Archives/Penn State Room, University Libraries, Pennsylvania State University.

Other sources: MA thesis biographical sketch 1915; PhD dissertation vita 1918; Owens Papers; author's correspondence with Teresa Cohen, May 1977; conversation between author and relatives, 6 Feb 1992; Cockey, "Mathematics at Goucher"; WhoAm 38 (Cohen, Simon); Ferdinand Hamburger Archives, The Johns Hopkins University; US census 1900, 1910, 1920, 1930 MD; SSDI.

Last modified: March 6, 2009.

COLE, Margaret (Buchanan). August 18, 1885–September 10, 1959.
West Virginia University (BA 1906), Bryn Mawr College (PhD 1922).

Margaret Buchanan was born in Clinton, Pennsylvania, the daughter of Sarah (Wiley) (b. 1858) and Aaron Moore Buchanan (b. 1856), natives of Pennsylvania. Her father graduated from Washington and Jefferson College in 1879 and from Western Theological Seminary in Pittsburgh, Pennsylvania, in 1882, the year her parents married. She was the second of three children; her brother, Joseph Kerr, was born in 1883 in Pennsylvania, and her sister, Mary B., was born in 1894 in West Virginia. Mary was deceased by 1910. Her father was a Presbyterian minister who moved from Pennsylvania to Morgantown, West Virginia, in 1886. He received the DD degree from Washington and Jefferson College in 1899.

From 1898 to 1902 Margaret Buchanan attended the preparatory school of West Virginia University at Morgantown before entering that university in 1902. While there she was one of a handful of women in her class. She was a member of the English club, Le Cercle Dramatique Francais, the YWCA, the athletic association, the yearbook board, the tennis club, the Athenaeum (student newspaper) board, and Kappa Delta sorority. She served as secretary of several of these organizations at least half a dozen times. Later, she was one of the founders of Beta Upsilon chapter of the social sorority Kappa Kappa Gamma there.

After Buchanan's graduation from West Virginia University in 1906, she taught mathematics for a year at Marshall College (then a state normal school, now Marshall University) in Huntington, West Virginia. She returned to West Virginia University in 1907 as a graduate student. She was an assistant in Greek and mathematics and taught in the university's preparatory school 1907–09. She was also an instructor of mathematics at the university 1909–12 before entering Bryn Mawr College for graduate study in 1912. She studied at Bryn Mawr College as a scholar in mathematics 1912–13, taught mathematics at the Baldwin School in Bryn Mawr 1913–14, taught mathematics in the high school at Parkersburg, West Virginia, 1914–15, and was instructor of mathematics at West Virginia University 1915–18. In the summer of 1918 she was a temporary office assistant on the scientific staff of the state geologist preparing the statistics and coal maps for the West Virginia geological survey of Webster County.

Buchanan returned to her graduate studies at Bryn Mawr College as a resident fellow in 1918–19 and as a graduate scholar in 1919–20, having attended the University of Chicago in the summer of 1919. She was awarded a President M. Carey Thomas European fellowship in 1918–19 for use the following year. She postponed that fellowship and was a resident scholar at Bryn Mawr 1919–20. She used the postponed fellowship and an Association of Collegiate Alumnae European fellowship in 1920–21 to study at the Sorbonne in Paris. While there she studied under Edouard Goursat, Henri Lebesgue, and Émile Picard in mathematics and under Marie Curie and M. Gabriel Lippmann in physics. She had previously traveled in Europe in the summer of 1910. In 1921–22 she finished her work for the PhD from Bryn Mawr as a fellow by courtesy, the first doctoral student of Anna J. Pell (Wheeler). Her doctorate, with a minor in physics, was awarded in June 1922.

Buchanan returned to the faculty of West Virginia University as assistant professor and was promoted to associate professor in 1925. She resigned her position to marry, on February 14, 1929, Harry Outen Cole (1874–1950). Cole was a native

of Morgantown, an 1898 graduate of West Virginia University, and a construction engineer who had, in the first decade of the century, played a role in the design of the Panama Canal. He had known Margaret Buchanan from the time she was a child since her father was the pastor of the Presbyterian church to which he belonged. He was widowed in 1921 and from about that time was president of Cole Bros. Construction Company in Morgantown.

In 1938 Margaret B. Cole again joined the faculty at West Virginia University and was instructor 1938–41, assistant professor 1941–52, associate professor 1952–55, and associate professor emeritus after her retirement in 1955 at age sixty-nine. A colleague at West Virginia University was Bird M. Turner with whom she had also overlapped as a graduate student at Bryn Mawr College.

As an active alumna of West Virginia University, Cole became the first woman president of the university's alumni association in June 1939 after serving four years on the alumni executive council. She joined the university alumni association's emeritus club, for alumni of fifty or more years, in 1956 and was vice president in 1958–59.

Margaret Buchanan Cole died in Morgantown in 1959, four years after her retirement. She was survived by her brother, a step-daughter, two nephews, and a niece.

Organizational affiliations: AMS, MAA.

Dissertation:
1922 [Buchanan, M.] Systems of two linear integral equations with two parameters and symmetrizable kernels. PhD dissertation, Bryn Mawr College, directed by Anna Johnson Pell (Wheeler). Printed version, 1923, Baltimore, MD, reprinted from *Amer. J. Math.* 45:155–85.

Publication:
1923 [Buchanan, M.] Systems of two linear integral equations with two parameters and symmetrizable kernels. *Amer. J. Math.* 45:155–85. Published version of PhD dissertation. Reviews: *JFM* 49.0289.03 (O. Toeplitz); *Rev. semestr. publ. math.* 31, pt. 1:4 (E. B. Cowley).

References to: AmMSc 4, 7–8, 9P.
"Alumni Elect First Woman President." *West Virginia University Alumni Magazine*, Summer 1939.
"Margaret Buchanan Cole, '06." (Obituary) *West Virginia University Alumni Magazine*, Fall 1959.

Other sources: PhD dissertation vita 1923; Bryn Mawr College Archives; communication with West Virginia University Archives; Maltby, *History of the Fellowships*; WhAm 3 (Cole, Harry Outen); US Census 1900, 1910, 1930 WV.

Last modified: December 8, 2008.

COLE, Nancy. October 15, 1902–July 7, 1991.
Vassar College (BA 1924), Radcliffe College (MA 1929, PhD 1934).

Nancy Cole was born in Boston, Massachusetts, the only child of Gertrude (Groce) (1870–1949) and Albert Henry Cole (1868–1925), both of Massachusetts. Ancestors of her mother had come to Plymouth on the Mayflower in 1620; those of her father had come to Plymouth in 1630. Her mother, a normal school graduate, and her father, a high school graduate, were married in 1898. Her father was in the grocery business.

Cole graduated from high school in Plymouth, Massachusetts, in 1919 and studied there as a post-graduate an additional year before entering Jackson College, the coordinate women's college associated with Tufts College (now University) at that time. She was at Jackson College with a Whiting scholarship 1920–22. She then attended Vassar College for two years and received her bachelor's degree in 1924.

From 1924 to 1926, Cole taught algebra and geometry to students preparing for college at the Oxford School in Hartford, Connecticut. In 1926–27 she studied at Radcliffe College, and the following year she taught at Vassar as an instructor. Cole studied at Radcliffe 1928–29 while also working as a tutor there. She received her master's degree in 1929 and continued as a student at Radcliffe with scholarship assistance through 1931. In 1930 she and her widowed mother were living in Cambridge, Massachusetts, although they maintained the family home in Plymouth.

Cole was an instructor at Wells College 1931–32. On February 20, 1933, she replied to a note from Eugenie Morenus who had inquired about her interest in a position at Sweet Briar College. Cole wrote, "I am in Plymouth this winter, writing my thesis and working on Professor Morse's Colloquium Lectures on the Calculus of Variations in the Large. Perhaps I have told you before, that for the latter I do the typing, fill in the formulae, and check the mathematics" (Faculty Files, Sweet Briar College Archives). Morse was also her dissertation advisor.

In the fall of 1933, Cole took a position as instructor at Sweet Briar College in Virginia, where, except for leaves, she remained for a decade. She replaced Ethel Moody, a 1930 Cornell PhD who left Sweet Briar for a position at Pennsylvania State College. The department head at Sweet Briar was Eugenie Morenus, a 1922 Columbia PhD who had been at Sweet Briar since 1909.

Over the two-year period 1932–34 Cole finished her graduate requirements and received her PhD from Radcliffe in 1934. She served as acting department head at Sweet Briar in 1934–35 and in 1941–42. While teaching at Sweet Briar, Cole was a member of the Virginia Academy of Science. She also regularly attended meetings of the AMS, a practice she continued until about 1950.

Cole began a leave from Sweet Briar in February 1943 to take a wartime appointment as visiting assistant professor and then visiting associate professor at Kenyon College in Gambier, Ohio. Her first full year at Kenyon, she was lecturer and teacher in mathematics in the Pre-Meteorology Program for the Army Air Force, and was a teacher in the Army Specialized Training Program from February until July 1944.

Nancy Cole resigned from Sweet Briar in May 1944 and after leaving Kenyon was assistant professor at Connecticut College for Women 1944–47. In 1947 she took a position as assistant professor at Syracuse University, where she was to remain the rest of her career. Ruth Wyckliffe Stokes, who had earned a PhD from Duke in 1931,

had joined the faculty at Syracuse the previous year, also as assistant professor. At Syracuse, Cole was assistant professor 1947–52, associate professor 1952–71, and associate professor emeritus after her retirement in 1971. In addition to her standard undergraduate teaching, Cole taught courses in finance, statistics, probability, statics, dynamics, vector analysis, and higher mathematics for engineers and physicists to undergraduates and some graduate students, and calculus of variations to graduate students. In March 1980 she was called back to take over an advanced calculus class when a colleague died suddenly. She reported that it was "a stimulating experience after nine years of retirement!" (Smithsonian questionnaire 1985).

In her 1985 questionnaire Cole also reported that her interest in mathematics was stimulated first by her high school geometry teacher Lucia Richardson; then by Tufts professor Edith L. Bush; by the chair of the mathematics department at Vassar, Henry Seely White; and by the several Harvard faculty members with whom she studied while doing her graduate work at Radcliffe.

Cole was a reader of the mathematical attainment test for the College Entrance Exam Board 1938–41 and served on the promotion and services committee of the Association of Mathematics Teachers of New York State 1958–65. She also held various offices with the Syracuse chapters of Phi Beta Kappa, Sigma Xi, and Sigma Delta Epsilon. For the twenty-year period before her retirement, Cole was the permanent faculty secretary of the local chapter of Pi Mu Epsilon, the national mathematics honor society, which was founded in 1914 at Syracuse.

Cole traveled extensively and attended the International Congresses of Mathematicians in Oslo (1936); Cambridge, Massachusetts (1950); Edinburgh (1958); Stockholm (1962); Nice (1970); Vancouver, British Columbia (1974); Helsinki (1978); and Berkeley (1986). In 1983 she traveled to the People's Republic of China as a member of a delegation of American university mathematics education specialists organized by People-to-People International to participate in a bilateral technical exchange with their Chinese professional counterparts.

In 1985 Cole described her political affiliation as Independent and her hobbies as hiking and swimming. From 1950 she was affiliated with the Foundation for Christian Living, now the Peale Center for Christian Living, in Pawling, New York. She was also a member of the Antiquarian Society of Plymouth, Massachusetts, from before 1950 and of the Pilgrim Society in Plymouth after 1961.

Nancy Cole died of a heart attack in her home in Plymouth, Massachusetts, at the age of eighty-eight in 1991. She was survived by a cousin and three second cousins. A memorial service was held at the Chiltonville Congregational Church in Plymouth. Philip Church ended his 2002 biography of Cole for the Syracuse department website by noting that "she was a good and thoughtful colleague and a very fine teacher."

Organizational affiliations: AMS, MAA, AWM, AAAS (fellow), AAUP, AAUW, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1931 Elementary divisors and the classification of quadratic forms. Minor thesis, Radcliffe College.

1934 The index form associated with an extremaloid. PhD dissertation, Radcliffe College, directed by Marston Morse. Summary: *Radcliffe Summaries of Theses*, 1931/1934, 152–59.

Publication:
1940 The index theorem for a calculus of variations problem in which the integrand is discontinuous. *Amer. J. Math.* 62:249–76. Reviews: *JFM* 66.0479.02 (J. Radon); *MR* 1,243d (M. Morse); *Zbl* 025.05902 (E. Hölder). Presented by title to the AMS, Washington, DC, 27 Apr 1940; abstract: *Bull. Amer. Math. Soc.* 46:411 #251.

Abstract not listed above:
1941 On a problem in the calculus of variations. *Amer. Math. Monthly* 48:2 #3. Presented to the MAA, Richmond, VA, 11 May 1940.

Presentation not listed above:
The index form associated with an extremaloid. Presented to the Virginia Acad. of Sci., Lexington, 2 May 1936.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P, 13P, 14–18; WhoAmW 1–6; WhoE 21, 23.
"Nancy Cole, 88; Was Professor of Mathematics." (Obituary) *Boston Globe*, 13 Jul 1991. Church, Phil. "Nancy Cole." Department of Mathematics at Syracuse University, 24 May 2002.

Other sources: Owens questionnaires 1937, 1940; Smithsonian questionnaire 1985; communication with Sweet Briar College Archives; US Census 1910, 1920, 1930 MA.

Last modified: March 6, 2009.

COLLIER, Myrtie. September 14, 1877–June 25, 1974.
University of Chicago (BS 1911), Université de Strasbourg (PhD 1930).

Myrtie Collier was born in Carthage, Missouri, the third of four children of Angeline (Willson) (b. 1839), of Kentucky, and Ervin Collier (b. 1832), a farmer, originally from Indiana. According to the 1880 and 1900 census records, her parents married in about 1871 and had two sons, Erwin (b. ca. 1873) and Ellis (b. 1875), and two daughters, Myrtie and Josie (b. 1880), all born in Missouri. The household in 1880 also included two daughters of her father, Wenona and Mary, ages nineteen and seventeen, born in Kansas, presumably from an earlier marriage. Myrtie Collier and her younger sister were both listed as teachers in the 1900 census.

After obtaining her bachelor's degree at age thirty-three in 1911 from the University of Chicago, Collier moved to California to become a mathematics teacher and chairman of the department at the Los Angeles State Normal School, predecessor of the University of California, Los Angeles. The State Normal School was established in 1881; in 1919 it offered its first instruction at the postsecondary level and became the Southern Branch, University of California, a two-year institution. It added a four-year teachers' curriculum in 1922, a four-year letters and science curriculum in 1923, and awarded its first bachelor's degree in 1923. While teaching at the Normal School, Collier was doing educational experiments and publishing articles in the journal *School Science and Mathematics*. She published one more article in this journal after she received her PhD in 1930.

Collier remained at the Southern Branch of the University of California as chairman of the department through 1920 and as assistant professor from 1920 until 1928, a year after the school's name changed to the University of California at Los Angeles. She took a year's leave of absence 1920–21 and was for some time in 1920 an associate in the mathematics department at the University of Chicago. While there she was a member of the program committee for the junior mathematical club at the university for 1920–21. In 1928 she left UCLA to pursue further graduate study and received her PhD cum laude from the University of Strasbourg in 1930, when she was fifty-two. She returned to Los Angeles, where she served as department chairman at Immaculate Heart College (now closed) from 1930 until her retirement in 1947 as professor emeritus. Upon her retirement, the students of the mathematics study club at Immaculate Heart honored her with a dinner for her successful service with the college. While at Immaculate Heart she often attended meetings of the AMS held in the Los Angeles area.

Collier was, by her own account, a great traveler. In addition to other trips, she was in Europe in summer 1937. She considered herself a student of the history of science and anthropology, and she enjoyed music. She was a Presbyterian.

Myrtie Collier maintained her residence in Los Angeles until her death of pneumonia as a consequence of left ventricular failure and longer term heart problems. She died in Good Samaritan Hospital in Los Angeles at age ninety-six in 1974 and was buried in Forest Lawn Memorial Park, in Glendale, California.

Organizational affiliations: AMS, MAA (charter member), AAAS (fellow), Pi Mu Epsilon.

Dissertation:
1930 Sur quelques points de la théorie des fonctions entières ou méromorphes d'ordre fini; Groupes primitifs simplement transitifs de degreé vingt et un. PhD dissertation, Université de Strasbourg. Paris: Gauthier-Villars.

Publications:
1914a Development work in arithmetic. *Sch. Sci. Math.* 14:294–97.
1914b Play and games in arithmetic. *Sch. Sci. Math.* 14:229–31.
1916 Practical work in arithmetic. *Sch. Sci. Math.* 16:524–29.
1922a Learning fractions. *Sch. Sci. Math.* 22:121–27.
1922b Learning to multiply fractions. *Sch. Sci. Math.* 22:324–29.
1922c The need of a general course in mathematics. *Sch. Sci. Math.* 22:845–50.
1933 Relearning fractions. *Sch. Sci. Math.* 33:389–93.

References to: AmMSc 9P–10P.

Other sources: Owens questionnaire 1940; US Census 1880, 1900 MO, 1920, 1930 CA; California death certificate; SSDI.

Last modified: December 9, 2008.

COLPITTS, Julia T. February 22, 1875–August 8, 1936.
University of Mount Allison College (BA 1899), Cornell University (MA 1900, PhD 1924).

Julia Trueman Colpitts was born in Pointe de Bute, New Brunswick, Canada, the third of eight children of Celia Eliza (Trueman) (1848–1930) and James Wallace Colpitts (ca. 1844–1919), who married in 1871. The family was from a long line of farm families in New Brunswick. The children were Edwin Henry (1872–1949), Andrew Weldon (1874–1901), Julia, Albert James (1876–1950), Elmer Clifford (1879–1963), Laura Jane (1882–1948), Walter Howard (1886–1972), and Mary Alice (1892–1920).

Several of the children went into teaching or scientific careers. Edwin, the eldest, first attended normal school in New Brunswick before earning a bachelor's degree at Mount Allison and an additional BA and an MS at Harvard. He was a distinguished communications engineer whose career was with the American Bell Telephone Company. Elmer C. Colpitts earned a PhD in mathematics from Cornell University in 1906 as a student of Virgil Snyder. His retirement from the State College of Washington (now Washington State University) was reported in 1950. Mary Colpitts, who also studied at Mount Allison, was an instructor of mathematics at the University of Wisconsin when she died of tuberculosis at age twenty-eight.

Julia Colpitts attended the public high school at Pointe de Bute and the normal School at Fredericton, New Brunswick, from which she graduated. She graduated from the University of Mount Allison College in 1899 with honors in mathematics. The next year she studied at Cornell University where she earned her master's degree in 1900.

After receiving her master's degree, Colpitts joined the faculty at Iowa State College of Agriculture and Mechanic Arts (now Iowa State University of Science and Technology) as an instructor. She was promoted to assistant professor in 1906 and to associate professor in 1913. Colpitts studied at the University of Chicago during the summer of 1912, at Columbia University during the summer of 1915, and again at Chicago during the summer of 1919. In addition, she took many graduate courses at Iowa State for which she received no credit since she was a member of the faculty. She coauthored an analytic geometry textbook with Maria Roberts, her mathematics department colleague and with whose family she was boarding at the time of the 1910 census. The book first appeared in 1918, with a second edition in 1926.

In addition to taking graduate courses at Iowa State, Colpitts had also taught graduate courses by the time she applied to Cornell in February 1922. Included among her letters of recommendation was one of March 15, 1922, from a former student who had done graduate work at Wisconsin, Yale, and Columbia. This student felt that Colpitts was surpassed by no other teacher of mathematics "with the single exception of Professor Pierpont of Yale" (Mary G. Miller to J. H. Tanner, Graduate School Records, Division of Rare and Manuscript Collections, Cornell University Library).

In 1922–23 Colpitts was granted a leave from Iowa State in order to study at Cornell. During that year she took a number of courses and worked on a dissertation with C. F. Craig. She then returned to Iowa State and remained on the faculty for the rest of her career. In early 1924 Craig went on leave to Europe, and J.

I. Hutchinson replaced him as the chairman of her doctoral committee. Colpitts received her PhD in 1924 at age forty-nine with her major analysis, first minor geometry, and second minor philosophy. In the summer of 1929 she did further studies at the University of Chicago.

Colpitts held leadership positions in a number of professional organizations. She was national secretary in 1926 and national president in 1927 of Sigma Delta Epsilon, the graduate women's scientific fraternity. She then became active in the Iowa Section of the MAA and served as vice chairman 1928–29 and 1932–33 and as chairman 1935–36. She was a member of the Iowa Academy of Science and was chair of the mathematics section for the April 1936 meeting of the academy. She attended the International Congress of Mathematicians in Toronto in 1924, in Bologna in 1928, and in Oslo in 1936.

Julia Colpitts was scheduled to depart for the United States from Hamburg on August 6, 1936, after the Oslo congress but became ill and died on August 8 in Southampton, England. She was sixty-one at the time of her death. The Julia Colpitts Memorial Fund was established in her memory by her brother Edwin H. Colpitts, with the income to be used to purchase books in mathematics for the Mount Allison library.

Organizational affiliations: AMS, MAA (charter member), Sigma Xi, Phi Kappa Phi, Sigma Delta Epsilon.

Thesis and dissertation:
1900 On the resolution of the algebraic function. MA thesis, Cornell University. Handwritten.
1924 Entire functions defined by series of the form $\sum f(n)\frac{z^n}{n!}$. PhD dissertation, Cornell University, directed by Clyde Firman Craig (on leave second semester 1923–24) and John Irwin Hutchinson. Typescript. Printed version, 1926, Princeton, NJ, reprinted from *Ann. of Math.* 2nd ser., 27:209–23.

Publications:
1918 with M. M. Roberts. *Analytic Geometry.* New York: John Wiley & Sons; London: Chapman & Hall. Reviews: *Amer. Math. Monthly* 26:250–52 (C. H. Currier); *Math. Gaz.* 10:345 (W. J. Dobbs); *Nature* 104:390 (S. Brodetsky); *Sch. Sci. Math.* 20:560 (H. E. Cobb). Second ed.: 1926. New York: John Wiley & Sons; London: Chapman & Hall. Reviews: *JFM* 52.0625.01 (W. Rinow); *Nature* 118 (suppl.): 28; *Science Progress* 12:534.
1926 Entire functions defined by certain power series. *Ann. of Math.* 2nd ser., 27:209–23. Published version of PhD dissertation. Reviews: *JFM* 52.0334.01 (A. Dinghas); *Rev. semestr. publ. math.* 33, pt. 1: 11 (W. A. Wythoff). Presented as "Entire functions defined by the series of the form $f(z)=\sum f(n)(z^n/n!)$" to the AMS, Ames, IA, 29 Nov 1924; abstract: *Bull. Amer. Math. Soc.* 31:118 #7.
1935 Mathematics in Japan and China. *Natl. Math. Mag.* 9:123–29.

Abstracts not listed above:
1924 The zeros of the function $f_k(z)\equiv\sum_{n=0}^{\infty} n^k \frac{z^n}{n!}$, where k is a positive integer. *Amer. Math. Monthly* 32:102 #4. Presented to a meeting of the MAA, Ames, IA, 2–3 May 1924.
1927a Asymptotic series. *Amer. Math. Monthly* 34:399 #8. Presented to a meeting of the MAA, Iowa City, IA, 6–7 May 1927.
1927b The real zeros and other properties of a certain entire function of genus unity. *Bull. Amer. Math. Soc.* 33:164 #9. Presented to the AMS, Lincoln, NE, 27 Nov 1926.
1929 The Bologna Congress. *Amer. Math. Monthly* 36:355 #10. Presented to a meeting of the MAA, Fairfield, IA, 26–27 Apr 1929.

References to: AmMSc 4–6.
"Recent deaths." *Science* n.s., 84 (1936): 175.

Allen, Edward S. "Julia Trueman Colpitts, 1875–1936." *Proc. Iowa Acad. Sci.* 44 (1937).

Other sources: Division of Rare and Manuscript Collections, Cornell University Library; communication with Iowa State University Archives; communication with Mount Allison Federated Alumni; DcAmB S4 (Colpitts, Edwin Henry); Wisconsin death certificate (Mary Alice Colpitts); 1881 Canadian Census; US Census 1910 1920 IA, 1920 WI.

Last modified: March 6, 2009.

COOPER, Elizabeth M. January 19, 1891–May 17, 1967.
Radcliffe College (BA 1913), Bryn Mawr College (MA 1923), University of Illinois (PhD 1930).

Elizabeth Morgan Cooper was born in Syracuse, New York, the eldest of six children of Jessie Marian (Bagg) (1866–1933) and Henry R. Cooper (1856–1928). Her mother, of Syracuse, and her father, of Woodbury, New Jersey, were married in Syracuse in 1889 and had three daughters followed by three sons. They were Elizabeth, Mary (1892–1983), Margaret (1895–1986), James (1896–1968), Joseph (1900–1978), and Charles (1902–1987). It appears that all of the children later graduated from either Radcliffe or Harvard. Her father was a Quaker and the manager of the caustic soda department of the Solvay Process Company for more than twenty years before his retirement in 1909. In 1910 he was described as a mechanical engineer. Her parents were active in the social life of Syracuse.

Cooper attended the Orchard School and the Goodyear Burlingame School, both private schools in Syracuse, before entering Radcliffe College in 1909, where she held a scholarship all four years. She noted in her dissertation vita that she "was privileged to have in most of her undergraduate work in mathematics, the patient, inspiring instruction of Professor Charles Leonard Bouton." She graduated magna cum laude in mathematics from Radcliffe in 1913.

During the next seventeen years Cooper taught in private preparatory schools and earned her graduate degrees. She first taught at the Baldwin School in Bryn Mawr, Pennsylvania, for fourteen years, 1913–1927. During 1920–23 she took graduate courses at Bryn Mawr College and received a master's degree in 1923, having been a graduate scholar her last year there. During 1924–25 she had a leave of absence from the Baldwin School and read mathematics at Newnham College, Cambridge University, England, on a fellowship from Radcliffe College. While there she studied with J. E. Littlewood, among others. She studied at Radcliffe College 1927–28. Cooper entered the University of Illinois in 1928, was an assistant 1929–30, and wrote her dissertation in geometry before receiving her doctorate in 1930 with a minor in physics.

After receiving her PhD, Cooper continued to work in private schools for the next seven years. She was principal of the Buckingham School in Cambridge, Massachusetts, from 1930 to 1935. In an obituary written for a school publication she was described as the "principal of Buckingham during the depths of the Depression ... [and] showed courage, clear-sighted practicality and humor, endearing her to staff and students alike." She was head of the mathematics department of the Chapin School in New York before becoming supervisor of mathematics and teacher training at Hunter College and chairman of the mathematics department at Hunter College High School in 1937. She remained chairman of the department at Hunter High School until she retired in 1958. While at Chapin, Cooper wrote, but did not publish, a textbook that she called "Algebra for Anne." Later she worked on a text called "Mathematics Made Plain" and on an article explaining some of her philosophy of teaching called "Mathematics for the Bright Student."

After her retirement Cooper returned to Syracuse, where she taught some undergraduate mathematics courses at Syracuse University and participated in teacher training seminars. The Buckingham obituary notes that after her retirement she also served as "a devoted tutor in mathematics to privileged and underprivileged

children alike. She was very much interested in anything that would promote better understanding among people of all races." This attitude was in keeping with her deep involvement with the Quakers. Among her contributions as a life member of the American Friends Service Committee was her service as director in summer 1939 of Sky Island Hostel for European refugees at Nyack, New York. She was also a a charter member and chairman of the management committee of a cooperative residence club in New York, which she described in **1944** as a hostel for elderly refugees. In 1948 it became Newark House of the New Jersey Fellowship Fund for the Aged, and Cooper served as its president. She described herself as a Democrat and was also active in the Radcliffe Club of Syracuse.

Elizabeth Cooper died in her home in Syracuse, New York, at age seventy-six in 1967. She was survived by her two sisters and three brothers.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Dissertation:

1930 Perspective elliptic curves. PhD dissertation, University of Illinois, directed by Arthur Byron Coble. Printed version, 1931, Baltimore, MD, reprinted from *Amer. J. Math.* 53:555–72.

Publications:

1924 America from within. *Thersites* (Newnham College). Reprint: 1925. *American Women's Club Magazine* (London), July.

1931 Perspective elliptic curves. *Amer. J. Math.* 53:555–72. Published version of PhD dissertation. Reviews: *JFM* 57.0824.01 (F. Schaale); *Zbl* 001.40202 (E. A. Weiss).

1939a Review of *An Analysis of Roots and Solutions of Exercises Used in Plane Geometry Texts*, by H. Pickett. *Scripta Math.* 6:47–48.

1939b Review of *Enriched Teaching of Mathematics in the High School. A Source Book for Teachers of Mathematics*, rev. ed., by M. N. Woodring and V. Sanford. *Scripta Math.* 6:47.

1939c Review of *General Mathematics*, by H. Crandall and F. E. Seymour. *Amer. Math. Monthly* 46:102.

1939d Review of *The Importance of Certain Concepts and Laws of Logic for the Study and Teaching of Geometry*, by N. Lazar. *Scripta Math.* 6:47.

1941 Review of *A Bibliography of Mathematical Education: A Classified Index of Periodical Literature since 1920, Containing 400 References*, by W. A. Schaaf. *Scripta Math.* 8:255–56.

1944 Safe and not too sorry: An account of the founding and functioning of a hostel for elderly refugees in New York City. *Better Times*, Dec 1: 7, 16.

1950 Introducing the multiplication table for signed numbers. *Math. Teacher* 43:420–21.

1952 Lead friendly light. *Friends Intelligence* 109:90–91.

1954 Need mathematics be a bug-bear? *Newsletter Assoc. Math. Teachers NY State* 4 (2).

References to: BiDWSci, BioWMath.

"Elizabeth Cooper Taught Math Here." (Obituary) *New York Times*, 20 May 1967.

Obituary. *The Buckingham Letter* 8, no. 1 (Fall 1967): 8.

Related manuscript materials:

Elizabeth Morgan Cooper Papers, 1909–1967. MC277, Schlesinger Library, Radcliffe Institute, Harvard University.

Other sources: PhD dissertation vita 1930; Owens questionnaires 1937, 1940; US Census 1900, 1910, 1920, 1930 NY; SSDI.

Last modified: March 6, 2009.

COPE, Frances (Thorndike). August 19, 1902–May 14, 1982.
Vassar College (BA 1922), Columbia University (MA 1925), Radcliffe College (PhD 1932).

Elizabeth Frances Thorndike, known as Frances, was born in New York City, the eldest child of Elizabeth (Moulton) (b. 1878) and Edward L. Thorndike (1874–1949), both originally from Massachusetts. She came from a distinguished academic family. Her mother had taken the four-year classical course at Boston University, while her father, who had studied with William James at Harvard, earned a PhD from Columbia in 1898 and became one of the most influential educational psychologists of the first four decades of the twentieth century. He was on the faculty at Teachers College, Columbia University, 1904–40; among his numerous books were one on the psychology of arithmetic and another on the psychology of algebra. Her father was one of four children, all of whom were college graduates and teachers. His two brothers were Ashley Horace (1871–1933), who received a PhD in literature from Harvard in 1898, and (Everett) Lynn (1882–1965), whose 1905 PhD from Columbia was in history. Both taught at Columbia. His sister, Mildred Thorndike (1888–1975), was a teacher.

Elizabeth Moulton and Edward L. Thorndike married on August 29, 1900. In 1904, two years after Frances Thorndike's birth, a second daughter was born but lived less than two weeks. Three sons followed: Edward Moulton (1905–1991), Robert Ladd (1910–1990), and Alan Moulton (1918–2006). All of the children eventually earned PhD's: Edward in physics from the California Institute of Technology in 1930, Robert in psychology from Columbia University in 1935, and Alan in physics from Harvard University in 1947.

Frances Thorndike first attended the Horace Mann School, a private school associated with Teachers College, Columbia University, that had opened as a coeducational school in 1887 and remained so for about twenty-five years. Thorndike also went to the public school in Montrose, New York, and then to Drum Hill High School in Peekskill, New York. She attended Vassar College and, according to her father's biographer, impressed psychologist Margaret Washburne as the most brilliant student she had ever had. After Thorndike's graduation from Vassar in 1922, she worked as an engineering assistant at the American Telephone and Telegraph Company in New York City 1922–24 and again 1925–27, after taking the year 1924–25 to earn a master's degree in mathematics from Columbia University.

Frances Thorndike became instructor of physics at Vassar for the year 1927–28 and studied at Radcliffe College in 1928–29 as a Vassar alumnae fellow. On June 29, 1929, Frances Thorndike married Thomas Freeman Cope. Cope was born in Texas in 1900, earned a bachelor's degree in 1923 and a master's degree in 1925 from Tulane University, and received his PhD in mathematics from the University of Chicago in 1927. He was at Harvard for the year 1928–29 as a National Research Council fellow. They remained in Cambridge the year after their marriage, he as instructor of mathematics at Harvard.

In 1930 the Copes moved to Ohio, where T. Freeman Cope was head of the mathematics department at Marietta College until 1937. Frances T. Cope completed her work for the PhD at Radcliffe as a student of George David Birkhoff in 1932. The publications resulting from her dissertation continue to be cited in mathematics

and physics literature. The Copes had three children: Freeman Widener (1930–1982); Elizabeth Frances, born in 1934; and Mary Thorndike, born in 1935. Freeman earned an MD from the Johns Hopkins University in 1955, and Elizabeth earned a PhD from Harvard in psychotherapy in 1963.

Frances Cope was an instructor of mathematics at Vassar College during second semester 1935–36. In 1937 the family moved to New York, and T. Freeman Cope joined the faculty at Queens College. He was assistant professor 1937–39, associate professor 1939–48, professor 1948–70, and department chairman 1937–50 and 1952–69. He also served as an expert consultant on mathematics tests for the Adjutant General's Office 1944–46. Frances T. Cope served as instructor at Queens in 1941 and at Adelphi College 1941–43.

Frances Cope was a member of the Vassar Club and the auxiliary of the Peekskill, New York, Community Hospital. She died suddenly at her home in Montrose, New York, at age seventy-nine in 1982. She was survived by her husband, three children, seven grandchildren, and three brothers. T. Freeman Cope died in Rochester, Minnesota, two years later.

Organizational affiliations: AAUW, Phi Beta Kappa.

Thesis and dissertation:
1925 [Thorndike, F.] Partial differential equations of the first order. MA thesis, Columbia University.
1932 Formal solutions of irregular linear differential equations. PhD dissertation, Radcliffe College, directed by George David Birkhoff. Summary: *Radcliffe Summaries of Theses* 1931/1934: 59–60. See also **1934–36**.

Publications:
1926 [Thorndike, F.] Applications of Poisson's probability summation. *Bell Syst. Tech. J.* 5:604–24.
1934–36 Formal solutions of irregular linear differential equations, Parts I & II. *Amer. J. Math.* 56:411–37 and 58:130–40. Published version of PhD diss. Reviews of Part I: *JFM* 60.0382.02 (O. Perron); *Zbl* 009.35401 (I. S. Sokolnikoff). Reviews of Part II: *JFM* 62.0523.02 (O. Perron); *Zbl* 013.20402 (I. S. Sokolnikoff). Part I presented by title to the AMS, Atlantic City, NJ, 27 Dec 1932; abstract: *Bull. Amer. Math. Soc.* 39:24 #8.

References to: AmMSc 6–8, 9P.
"Frances Thorndike Weds Dr. T. F. Cope; Daughter of Teachers College Professor Married at Parents' Summer Home." *New York Times*, 1 Jul 1929.
"Frances T. Cope." (Obituary) *Peekskill (NY) Sunday Star*, 16 May 1982.
Obituary. *Harvard Magazine*, Jan-Feb 1983.

Other sources: Owens questionnaire 1940; Vassar College Archives; communication with Field Library (Peekskill, NY); Geraldine M. Joncich, *The Sane Positivist: A Biography of Edward L. Thorndike* (Middletown, CT: Wesleyan University Press, 1968); WhoAm 38 (Cope, Thomas Freeman); US Census 1920 NY, 1930 MA, 1930 NY; SSDI.

Last modified: July 19, 2009.

COPELAND, Lennie P. March 30, 1881–January 11, 1951.
University of Maine (BS 1904), Wellesley College (MA 1911), University of Pennsylvania (PhD 1913).

Lennie Phoebe Copeland was born in Brewer, Maine, the only child of Emma (Stinchfield) (b. 1851) and Lemuel Copeland (1845–1927), both natives of Maine. Her parents married in 1867 and by 1900 were living in Bangor, Maine, where her father was engaged in manufacturing.

Copeland graduated from the Bangor high school before going to the University of Maine, from which she graduated in 1904. At the University of Maine, Copeland was a member of Phi Kappa Phi, an honor society for scholarship; in 1921 she was named an alumna member of Phi Beta Kappa at Maine. She also belonged to Alpha Omicron Pi social sorority.

Copeland taught mathematics from 1905 to 1910 in the Bangor high school. She then went to Wellesley College, where she earned a master's degree in 1911. She continued her graduate work at the University of Pennsylvania, where she was a Bennett fellow and a Pepper fellow 1911–13. She received her doctorate in 1913 with a dissertation in invariant theory directed by Oliver E. Glenn, who had earned a PhD from Pennsylvania in 1905.

Immediately after receiving her doctorate, Copeland was hired by Wellesley and spent the rest of her career there. She was instructor 1913–20, assistant professor 1920–28, associate professor 1928–37, professor 1937–46, and professor emeritus after her retirement in 1946. Colleagues in the Wellesley mathematics department included Helen Merrill, who was chair of the department 1916–32; Roxana Vivian; Mabel Minerva Young; Clara Eliza Smith; Marion Stark; and Helen G. Russell. All but Stark and Russell were on the Wellesley faculty when Copeland was a master's student there; Stark arrived in 1919 and Russell in 1928. Among Copeland's teaching responsibilities was a course she developed in the history of mathematics. In connection with this interest she collected rare books, particularly on mathematical recreations, for the Treasure Room of the library. Copeland wrote a descriptive catalogue of the rare mathematical books in the Wellesley library and spoke about them several times to the Wellesley mathematics club.

Copeland's appointments at Wellesley included terms on committees on long-term educational policy; reappointments, promotions and dismissals; curriculum and instruction; lectures, which she chaired; and the library. She spoke to Wellesley clubs and to various professional associations. Copeland was one of the six members of the Wellesley mathematics department who became members of the MAA before April 1, 1916, and, hence, were charter members. She often attended the annual and summer meetings of the association and served on the program committees for the annual meetings of 1922 and 1923, chairing the latter. She was the first woman president of the New England Association of Teachers of Mathematics 1925–27.

In the late 1930s, Copeland described herself as a Republican and as Congregational. She was on the Service Fund of the Christian Association and was treasurer at one time. Copeland's many interests included attending plays, reading, driving, hiking, and traveling. She was a member of the Appalachian Mountain Club and served as a counselor in natural history for the club. Her travels included trips to Europe 1930; Alaska 1931; Labrador 1934; Egypt, central Africa, and the Near East 1935; Scandinavia 1936; Mexico 1937; and Puerto Rico 1939. The trip in 1935

lasted from mid-February until early June and was made with Clara Eliza Smith, her close friend who had retired from the mathematics department at Wellesley the summer before. It included Egypt, Palestine, Syria, Uganda, Turkey, Greece, and Italy. In 1937, Copeland wrote to Helen Owens that she would be spending that summer on "Miss Smith's farm in the hills of Connecticut." Smith died suddenly of a cerebral hemorrhage in May 1943 in the home she shared with Copeland in Wellesley. At the time of Copeland's retirement three years later, it was noted in the Wellesley alumnae magazine that "her friendship with Clara E. Smith, a former member of our Mathematics Department, needs no elaboration to those who knew them both. And the courage shown by Miss Copeland, when after Miss Smith's death she picked up the shattered plans of her life and rebuilt them beautifully, has made a profound impression on all of us" (Wellesley College Archives).

Copeland was awarded an honorary Doctor of Science degree by the University of Maine in 1948. A February 1949 description of the occasion by Carol S. Scott (Mrs. Wm. C. Scott), a mathematics instructor at St. Petersburg Junior College in Florida who had graduated from Wellesley in 1911, noted that "the Maine citation especially stressed her making mathematics 'a joyous adventure' to her years of classes but after the speech she gave to the almost a thousand banqueting alumni the night before commencement it could have lauded her ability to 'steal the show' from formal lecturers" (Alumni Record Collection; Folder: Copeland, Lennie Phoebe; University of Pennsylvania Archives).

Following her retirement from Wellesley, Copeland made her home in St. Petersburg with Carol Scott, whom she had known at Wellesley. Lennie Phoebe Copeland died in St. Petersburg in January 1951 at age sixty-nine. The funeral was held in St. Petersburg and was followed by burial in Brewer, Maine. She was survived by several cousins.

Organizational affiliations: AMS, MAA (charter member), AAAS, Phi Beta Kappa, Sigma Xi.

Dissertation:

1913 On the theory of invariants of n-lines. PhD dissertation, University of Pennsylvania, directed by Oliver Edmunds Glenn. Printed version, 1914, New Era Printing Co., Lancaster, PA, reprinted from *Ann. of Math.* 2nd ser., 16:7–14.

Publications:

1914 On the theory of invariants of n-lines. *Ann. of Math.* 2nd ser., 16:7–14. Published version of PhD dissertation. Reviews: *JFM* 45.0225.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 23, pt. 2: 11 (W. A. Wythoff). Presented by title as "Concerning the theory of invariants of plane n-lines" to the AMS, New York City, 22 Feb 1913; abstract: *Bull. Amer. Math. Soc.* 19:391–92 #8.

1916 Review of *Solid Geometry*, by S. F. Richardson. *Amer. Math. Monthly* 23:383–84.

1921a The triangle of reference in elementary analytic geometry. *Amer. Math. Monthly* 28:250–53. Reviews: *JFM* 48.0716.05 (E. Salkowski); *Rev. semestr. publ. math.* 30, pt. 1: 4 (R. C. Archibald).

1921b Wellesley's rara mathematica. *Wellesley Alumnae Quarterly* (April).

1923a Mathematics club programs. *Math. Teacher* 16 (December).

1923b Note on certain semi-invariants of n-lines. *Ann. of Math.* 2nd ser., 25:137–41. Reviews: *JFM* 50.0408.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 31, pt. 2: 21 (W. A. Wythoff). Presented by title to the AMS, Chicago, 14 Apr 1922; abstract: *Bull. Amer. Math. Soc.* 28:291 #12.

1926 Review of *Plane Trigonometry with Tables*, 3d ed., by C. I. Palmer and C. W. Leigh. *Amer. Math. Monthly* 33:101–02.

1930a Matrix conditions for multiple points of a ternary cubic. *Ann. of Math.* 2nd ser., 31:629–32. Review: *JFM* 56.1168.02 (F. Schaale). Presented as "Matrix conditions that the ternary cubic locus may have multiple points" to the AMS, Boulder, CO, 29 Aug 1929; abstract: *Bull. Amer. Math. Soc.* 35:766 #30.
1930b Review of *A Source Book in Mathematics*, by D. E. Smith. *Amer. Math. Monthly* 37:310–12.
1934 Clara Eliza Smith – an appreciation. *The Wellesley Magazine* (June): 431–32.
1938 Review of *Calculus*, by J. V. McKelvey. *Amer. Math. Monthly* 45:113–14.

Abstract not listed above:
1933 On the theory of invariants of n-planes. *Bull. Amer. Math. Soc.* 39:871–72 #306. Presented to the AMS, Cambridge, MA, 27 Dec 1933.

References to: AMSc 3–8, AmWom 1935–40, BiDWSci, WhAm 3.
Harrison, Ida R., Carol S. Scott, and Marion E. Stark. "Lennie P. Copeland." *The Wellesley Magazine* July 1946, 319.
"Miss Lennie Copeland." (Obituary) *New York Times*, 13 Jan 1951.
"Lennie Phoebe Copeland, Wellesley Ex-Professor." (Obituary) *New York Herald Tribune*, 13 Jan 1951.

Other sources: Owens questionnaire 1937; Owens Papers; University of Pennsylvania Archives; Wellesley College Archives; US Census 1880, 1900, 1920 ME, 1930 MA.

Last modified: June 23, 2011.

COWLEY, Elizabeth B. May 22, 1874–April 13, 1945.
Indiana Normal School (BS 1893), Vassar College (BA 1901, MA 1902), Columbia University (PhD 1908).

Elizabeth Buchanan Cowley was born in Allegheny (now part of Pittsburgh), Pennsylvania, the eldest and by 1900 the only surviving child of five born to Mary Junkin (Buchanan) (1853–1937) and John Cowley (b. 1843). Mary Junkin Buchanan was born in Ohio; she attended public schools in Allegheny and the Pittsburgh Female College (now Chatham College), from which she received a Mistress of English Literature [or Language] degree in 1870. On February 27, 1873, in Allegheny, Mary Buchanan married John Cowley of Pennsylvania. Mary B. Cowley was a volunteer supervisor of playgrounds in Pittsburgh for most of the first decade of the century before being elected supervisor of playgrounds and vacation schools. She was a member of the school board in Pittsburgh and was engaged in other civic and cultural activities, some of which are indicated in her entry in *Woman's Who's Who in America 1914–1915*. In 1900 John Cowley was an auditor; he was deceased by 1914.

Elizabeth Cowley attended the public schools of Allegheny after which she studied for two years before receiving a BS degree in 1893 from Indiana Normal School (now Indiana University of Pennsylvania). She taught for the next four years in public schools in Pennsylvania and was given a life diploma by the state.

Cowley entered Vassar College in September 1897 and received her BA degree four years later. She was awarded the graduate scholarship in mathematics and astronomy for the next year and received her MA degree from Vassar in 1902. Cowley remarked in the vita accompanying her later PhD dissertation, "Through the courtesy of Professor [Mary W.] Whitney an opportunity was given to me to work out the definitive orbit of a comet. Dr. [Caroline E.] Furness gave valuable advice and Miss [Ida] Whiteside assisted in calculations." The paper was published as **1907d** with Whiteside, a fellow graduate student, as coauthor. In 1940 Cowley referred to it as a "Prize Paper" (Owens questionnaire).

In 1902 Cowley was appointed instructor in mathematics at Vassar and continued at that rank until 1913. She attended the summer sessions at the University of Chicago 1903–05, where she had twelve weeks of mathematics and physics each year. She began work at Columbia University during the second semester of the academic year 1905–06 and remained for summer school in 1906 and the next academic year, 1906–07. Her doctorate was awarded by Columbia in 1908. She wrote in the vita accompanying the dissertation, "I desire to express my gratitude to all my teachers, but especially to Professor Keyser, who is able in an unusual degree to inspire his students with a hearty enthusiasm for study. To Professor Henry S. White, as head of my department at Vassar College, I am indebted for encouragement, criticism, and sympathy with my work."

Cowley remained at Vassar, except for leaves of absence, until 1929. She was assistant professor 1913–16 and associate professor 1916–29. While at Vassar she continued her studies, was active in a number of mathematical societies, and published regularly. She reported in 1914 that she had studied at the universities in Göttingen and Munich as well as those indicated above. She attended the International Congress of Mathematicians (ICM) held at Cambridge, England, in 1912. She belonged to two foreign mathematical societies and was a charter member of the

MAA. She was particularly active in the MAA during its first decade. She served on the program committee for the annual meeting at the University of Chicago in 1917 and was elected to the MAA council to serve January 1918–January 1921. However, in 1920 the MAA incorporated and she automatically became a member of the new board of trustees with a term ending in December 1920. She also stood for election to vice president in 1921 and 1925. In addition to contributing the articles and reviews indicated below, Cowley contributed to a number of other educational and popular publications, writing on her 1940 questionnaire for Helen Owens that she had published 100 articles. She also served on the editorial board of the abstracting journal *Revue semestrielle des publications mathématiques* and was a regular reviewer for the journal from 1908 until 1926. Furthermore, among the twenty-four book reviews she published in the *Bulletin* of the AMS, seventeen were reviews of books written in French, German, Italian, or Spanish.

Cowley had a leave of absence from Vassar 1926–29 and was promoted to professor while on leave. She resigned her position at Vassar in June 1929 to return to Pittsburgh to be with her mother. She wrote in 1937 that she "came to do a special piece of work" (Owens questionnaire). She immediately took a teaching position in a Pittsburgh high school and continued teaching until 1938, near the time of her mother's death. She was active in local professional organizations: she was sponsor for various activities of the Pittsburgh public high schools, she became president of the mathematics section of the Pennsylvania State Education Association in 1934, and she was for a time president of the Association of Teachers of Mathematics of Western Pennsylvania.

Cowley's mathematical interests were broad. During the 1920s she published and spoke on historical topics. During that period she also studied crystallography because she had read some work on phases of atomic structure that interested her. Later her publications were more in the field of mathematics education, and in December 1934 she directed a symposium on "Methods of making mathematics interesting" by Pittsburgh teachers at an NCTM meeting held in Pittsburgh at the same time as the annual MAA meeting. She gave many invited talks at schools and one to the Central Association of Science and Mathematics Teachers. In 1941 she wrote a book about public education in the United States as exemplified by Massachusetts, Pennsylvania, Michigan, and California.

In her entry in the 1914 *Woman's Who's Who of America*, Cowley reported that she was a member of the Daughters of the American Revolution and of the National Plant, Flower and Fruit Guild; that she was in favor of women's suffrage; and that she enjoyed outdoor sports. In 1940, after she had retired from teaching, she indicated that she was traveling and writing, and that poetry that she had written had been published.

At some time after her mother's death and her own retirement from teaching in Pittsburgh, Elizabeth Cowley moved to Fort Lauderdale, Florida. She suffered a stroke in 1941 that left her unable to speak or use her right side. A newspaper item in 1943 described how she had "overcome her handicap completely through her indomitable spirit and strong determination to carry on." It then described how, with only her left hand, she was able to keep up her writing and correspondence, embroider, weave, and sew; at the time of the article she had made seven large Red Cross afghans to aid the war effort. Elizabeth Cowley died in her residence in Fort Lauderdale, Florida, at age seventy in 1945 and was cremated.

Organizational affiliations: AMS, MAA (charter member), Circ. Mat. di Palermo, Deutsch. Math.-Verein., AAAS, Phi Beta Kappa.

Dissertation:

1908 Plane curves of the eighth order with two real four-fold points having distinct tangents and with no other point singularities. PhD dissertation, Columbia University. Printed by Press of the New Era Printing Co., Lancaster, PA.

Selected publications:

1907a Review of *A First Course in Analytical Geometry, Plane and Solid, with Numerous Examples*, by C. N. Schmall. *Bull. Amer. Math. Soc.* 13:246–47.

1907b Review of *Lehrbuch der analytischen Geometrie*, vol. 1: *Geometrie in den Grundgebilden erster Stufe und in der Ebene*, by L. Heffter and C. Koehler. *Bull. Amer. Math. Soc.* 13:247–49.

1907c Review of *Nichteuklidische Geometry*, by H. Liebmann. *Bull. Amer. Math. Soc.* 13:511–12.

1907d with I. Whiteside. Definitive orbit of the comet 1826.II *Astron. Abh. Ergänzungshefte Astron. Nachr.* 2, no. 13.

1909 Review of *La Géométrie analytique Générale*, by H. Laurent. *Bull. Amer. Math. Soc.* 15:363–64.

1910 Review of *Coordinate Geometry*, by H. B. Fine and H. D. Thompson. *Bull. Amer. Math. Soc.* 16:314–18.

1911 Review of *Synthetische Theorie der Cliffordschen Parallelen und der linearen Linenörter des elliptischen Raumes*, by W. Vogt. *Bull. Amer. Math. Soc.* 17:315–16.

1913 Review of *Spezielle Flächen und Theorie der Strahlensysteme*, by V. Kommerell and K. Kommerell. *Bull. Amer. Math. Soc.* 19:253–54.

1914a Review of *Lezioni di Geometria proiettiva ed analitica*, by E. Ciani. *Bull. Amer. Math. Soc.* 20:419–21.

1914b Review of *Ueber die Theorie benachbarter Geraden und einen verallgemeinerten Krümmungsbegriff*, by W. F. Meyer. *Bull. Amer. Math. Soc.* 20:324–25.

1915a Review of *Die neuzeitliche Entwicklung des mathematischen Unterrichts an den höheren Mädchenschulen Deutschlands inbesondere Norddeutschlands*, by J. Schröder. *Bull. Amer. Math. Soc.* 21:244–46.

1915b with W. B. Berry and C. C. Grove. Round Table on the Teaching of Calculus. *Math. Teacher* 8:65–72.

1917a Comprehensive examinations. *Math. Teacher* 1:30–34. Review: *Sch. Rev.* 26:553.

1917b Review of *Compendio de Álgebra de Abenbéder* [known as Ibn Badr], trans. and with an introduction by J. A. Sánchez Pérez. *Bull. Amer. Math. Soc.* 23:325–26.

1918 Review of *Differential Calculus*, by H. B. Phillips, and *Integral Calculus*, by H. B. Phillips. *Bull. Amer. Math. Soc.* 24:488–89.

1920 College algebras. Review of *College Algebra*, by E. B. Skinner, *Advanced Algebra*, by W. C. Brenke, and *A First Course in Higher Algebra*, by H. Merrill and C. E. Smith. *Bull. Amer. Math. Soc.* 26:323–29.

1921 Review of *Descriptive Geometry*, by E. Kenison and H. C. Bradley. *Bull. Amer. Math. Soc.* 27:334–35.

1922 Review of *Storia della Geometria Descrittiva dalle Origini sino ai Giorni Nostri*, by G. Loria. *Bull. Amer. Math. Soc.* 28:414.

1923a An English text on mathematics written about 1810. *Amer. Math. Monthly* 30:189–93. Reviews: *JFM* 49.0007.04 (E. Salkowski); *Rev. semestr. publ. math.* 34 (pt. 1): 7 (R. C. Archibald). Presented to the MAA, Rochester, NY, 6 Sept 1922; abstract: *Amer. Math. Monthly* 29:286 #7.

1923b A humanized course in mathematics for the first year in a woman's college. *Education* 44:92–99.

1923c An Italian mathematical manuscript [Columbia X511 Al 3]. In *Vassar Mediæval Studies, by Members of the Faculty of Vassar College* edited by C. F. Fiske, 377–405. New Haven, CT.: Yale Univ. Press.
1923d Review of *Introduction à la Géométrie Non-Euclidienne*, by A. MacLeod. *Bull. Amer. Math. Soc.* 29:424.
1923e Review of *Lehrbuch der darstellenden Geometrie für technische Hochschulen*, vol. 2, 3rd ed., by E. Müller, and *Vorlesungen über darstellende Geometrie*, vol. 1: *Die linearen Abbildungen*, by E. Müller, rev. by E. Kruppa. *Bull. Amer. Math. Soc.* 29:478–79.
1923f Review of *Nichteuklidische Geometrie*, 3rd rev. ed., by H. Liebmann. *Bull. Amer. Math. Soc.* 29:424.
1924 Review of *Lehrbuch der Analytischen Geometrie*, vol. 2: *Geometrie im Bündel und im Raum*, by L. Heffter. *Bull. Amer. Math. Soc.* 30:279.
1925 Review of *Complementi di Geometria Descrittiva—visibilita—ombre—chiaroscuro—prospettiva lineare*, by G. Loria. *Bull. Amer. Math. Soc.* 31:466.
1926a Note on a linear diophantine equation. *Amer. Math. Monthly* 33:379–81. Reviews: *JFM* 52.0142.05 (H. Grunsky); *Rev. semestr. publ. math.* 34, pt. 1: 21 (R. C. Archibald). Presented as "Note on a generalization of the old puzzle of 8, 5, and 3 pint vessels" to the AMS, New York City, 28 Oct 1922; abstract: *Bull. Amer. Math. Soc.* 29:9–10 #21. Also presented as "Further generalizations of the old mathematical puzzle of three vessels with capacities of 8, 5 and 3" to the AMS, Cambridge, MA, 28 Dec 1922; abstract: *Bull. Amer. Math. Soc.* 29:115 #48.
1926b Review of *An Introductory Account of Certain Modern Ideas and Methods in Plane Analytical Geometry*, by C. A. Scott. *Bull. Amer. Math. Soc.* 32:295.
1927 Some suggestions on the technique of teaching plane geometry. *Math. Teacher* 20:370–74.
1928a Review of *Examen des Différentes Méthodes Employées pour Résoudre les Problèmes de Géométrie*, by G. Lamé. *Bull. Amer. Math. Soc.* 34:381.
1928b Solid geometry and the new curricula. *Amer. Math. Monthly* 35:251–53. Review: *JFM* 54.0075.02 (G. Feigl).
1929a A reply to "The position of the high school teacher of mathematics." *Math. Teacher* 22:14–17.
1929b Review of *Vorlesungen über Darstellende Geometrie*, vol. 2: *Die Zyklographie*, by E. Müller, edited from the manuscript by J. L. Krames. *Bull. Amer. Math. Soc.* 35:737.
1929c The vocabulary of plane geometry. *J. Ed. Res.* 20:392–94.
1930 Are corollaries indispensable in plane geometry? *Sch. Sci. Math.* 30:319–20.
1931 Review of *A Short History of Mathematics*, by V. Sanford. *Bull. Amer. Math. Soc.* 37:333.
1932 *Plane Geometry*. New York: Silver, Burdett & Co. Reviews: *High Sch. J.* 15:183,185; *Math. Teacher* 26:117; *Sch. Sci. Math.* 32:679–80 (C. A. Stone); Three modern textbooks in secondary-school mathematics. *Sch. Rev.* 475–77 (J. S. Georges).
1933 A mathematical fantasy. *Sch. Sci. Math.* 33:535–36.
1934a Geometry's tribute to tradition. *Sch. Sci. Math.* 34:266–74. Review: *Sch. Rev.* 43:142 (R. R. Breslich).
1934b *Solid Geometry*. New York: Silver, Burdett & Co. Reviews: *Math. Teacher* 26:117; *Natl. Math. Mag.* 9:119–20 (P. K. Smith); *Sch. Sci. Math.* 35:332 (C. A. Stone).
1934c Technical vocabularies for plane and solid geometry. *J. Ed. Res.* 27:344–54. Preliminary report **1929c**. Presented in absentia at the ICM, Zürich, 4–12 Sept 1932; abstract: *Verhandlungen Kongress Zürich, 1932* 2:357–58.
1937 Ratio and proportion in high school curriculums. *Sch. Sci. Math.* 37:1079–88. Presented as "Function concepts in high school curriculums" at the ICM, Oslo, 13–18 Jul 1936.
1941 *Free Learning*. Boston: B. Humphries. Reviews: *Ed. Res. Bull.* 21:185 (J. D. Teller); *Peabody J. Ed.* 19:233.

Abstract not listed above:
1935 Mathematics and character education. *Amer. Math. Monthly* 42:344 #4. Presented to the MAA, Grove City, PA, 13 Oct 1934.

References to: AmMSc 2–6, BioWMath, WhoWWA.
"Invalided Educator Overcomes Handicap and Aids Red Cross," *Fort Lauderdale* (*FL*) *Daily News*, 26 Apr 1943.

Other sources: PhD dissertation vita 1908; Owens questionnaires 1937, 1940; Vassar College Archives; communication with Indiana University of Pennsylvania Archives and with Alumnae and Alumni of Vassar College (AAVC); WomWWA (Cowley, Mary Junkin Buchanan); US Census 1870, 1880, 1900, 1920 PA; Florida death certificate.

Last modified: March 6, 2009.

CRATHORNE, Charlotte Elvira (Pengra). May 30, 1875–February 9, 1916. University of Wisconsin (BA 1897, PhD 1901).

Charlotte Elvira Pengra was born in Juda, Wisconsin, the eldest of five children of Mary Ellen (Preston) (b. 1853) and Winfield Sherman Pengra (b. 1847), both natives of Wisconsin. In 1880 the family was living in Jefferson, Wisconsin, near Madison, and her father was a farmer; in 1900 they lived in Madison and he was a landlord. All of the five Pengra children received bachelor's degrees from the University of Wisconsin; in addition to Charlotte, they were Mabel (b. 1877), Preston (b. 1880), Delia (b. 1882), and Marshall (b. 1885), and they earned their degrees in 1899, 1902, 1904, and 1905, respectively.

Charlotte Pengra graduated from the Madison, Wisconsin, high school before attending the University of Wisconsin, from which she received her BA in 1897, the same year that Wisconsin awarded its first PhD in mathematics. She then taught in high schools in Fox Lake and Sparta, both in Wisconsin. In a letter to Charles S. Slichter, inquiring about a possible fellowship for graduate study at the University of Wisconsin, written May 12, 1899, from Sparta, Pengra indicated that she wanted a more complete college education for its own sake and because she would like to teach mathematics to students more advanced than in the high school. She indicated that she wanted to take a PhD, probably from Wisconsin, and that if she had the fellowship she would not teach again until she received the degree. Whereas the financial question was "not very pressing," she wrote that if she did not get the fellowship she would stay in Sparta (Biographical Files, Charles S. Slichter, Box 35, Miscellaneous University Correspondence 1886–1946, University of Wisconsin-Madison Archives). She did receive it and completed her work for the PhD with L. W. Dowling two years later, as the third Wisconsin PhD in mathematics. After receiving her doctorate, Pengra was in charge of the mathematics department of a high school in Elgin, Illinois, for three years.

On June 21, 1904, in Madison, Charlotte Pengra married the English-born Arthur Robert Crathorne (1873–1946), who had been a graduate student and instructor in mathematics at Wisconsin. He had come to the United States with his family as a young boy, grew up in Illinois, received a bachelor's degree from the University of Illinois in 1898, was a tutor in mathematics and astronomy at the University of Maine, and had been at Wisconsin since 1900. Shortly after the wedding they sailed from Montreal to Liverpool to spend some time in England before continuing to Germany.

The Crathornes spent the years 1904 through 1907 studying mathematics at Göttingen, where A. R. Crathorne received his PhD in 1907. Their daughter Mary Preston was born on November 28, 1906. On their return from Göttingen, A. R. Crathorne took a position at the University of Illinois. The Crathornes had two more children: Anne Harrison, born July 31, 1909, and Arthur Robert Jr., born June 5, 1911.

Charlotte Crathorne's daughters report that she was a collaborator in the preparation of *College Algebra* by H. L. Rietz and A. R. Crathorne in 1909, although she is not mentioned in the extensive acknowledgements in the preface to the book.

After an illness of about three years, Charlotte Crathorne died of breast cancer at her parents' home in Brodhead, Wisconsin, in 1916 at age forty. She was buried

in Juda, Wisconsin. Arthur Robert Crathorne remarried in 1917 and spent the rest of his career at Illinois.

Organizational affiliation: Phi Beta Kappa.

Dissertation:
1901 [Pengra, C. E.] On functions connected with special Riemann surfaces, in particular those for which $p = 3$, 4, and 5. PhD dissertation, University of Wisconsin, directed by Linnaeus Wayland Dowling. Printed version, 1904, Madison, WI, reprinted from *Trans. Wisc. Acad. Sci., Arts, Letters* 14:655–69.

Publication:
1904 [Pengra, C. E.] On the conformal representation of plane curves, particularly for the cases $p = 4$, 5, and 6. *Trans. Wisc. Acad. Sci., Arts, Letters* 14:655–69. Published version of PhD dissertation. Talk with same title presented by title to the Wisconsin Academy of Sciences, Arts, and Letters, Milwaukee, 30 Dec 1903.

References to: BioWMath.
"Beautiful Home Wedding," *Madison Democrat*, 22 June 1904.

Other sources: Private correspondence with Lilah Pengra; University of Wisconsin-Madison Archives (Biographical Files, Charles S. Slichter, Box 35, Miscellaneous University Correspondence 1886–1946); NatCAB 35 (Crathorne, Arthur Robert); communication with Mark McKinzie 1998; Ray F. Pengra and Mary Markham, *Genealogies: Morse, Mason, Lyon, Pengra* (Brodhead, WI: The Independent-Register, 1959); US Census 1880, 1900, 1910, 1920 WI, 1910 IL; Wisconsin death certificate.

Last modified: December 9, 2008.

CRONIN, Sarah Elizabeth. July 1, 1877–October 2, 1958.
University of Iowa (BS 1903, MS 1905), Columbia University (PhD 1917).

Sarah Elizabeth Cronin was the youngest of nine (living) children of Deborah (ca. 1838–ca. 1918) and Cornelius Cronin (ca. 1830–ca. 1917), a farmer in northeast Iowa. Her parents had emigrated from Ireland in the mid-nineteenth century before their marriage. She was born in Iowa, probably in Allamakee County in the northeast corner of the state. Census records indicate that her siblings were John (b. ca 1860), June (b. ca. 1862), Timothy (b. ca. 1864), Catherine (b. ca. 1865), Johanna (b. ca. 1868), William (b. ca. 1869), Lucy (b. ca. 1884), and James (b. ca. 1885).

According to US census records, in 1900 Sarah Cronin was a school teacher and living in Cherokee County, in western Iowa, with her parents. She received her undergraduate degree in 1903 from the University of Iowa (officially the State University of Iowa) in Iowa City, and in April of that year the university awarded her a scholarship in mathematics to continue her studies. However, the following fall she was teaching mathematics in the Creston, Iowa, high school. After a year she returned to the University of Iowa as a fellow in mathematics and received her master's degree in 1905.

Cronin was instructor of mathematics at Iowa State College of Agriculture and Mechanic Arts (now Iowa State University of Science and Technology) in Ames 1905–07. She was then instructor at the University of Iowa 1907–15, although she apparently had a leave of absence 1913–15, when she was a graduate student at Columbia University. She received her PhD from Columbia in 1917 with a dissertation written under the direction of Edward Kasner. Cronin returned to the University of Iowa as assistant professor in 1915 and remained for three years.

In 1918 Cronin went to the Equitable Life Assurance Society in New York (now the AXA Equitable Life Insurance Company) as chief of the policy change division. The following year she passed the first two parts of the associate examinations of the Actuarial Society of America. Cronin passed the third and fourth parts in 1922 and 1923 and was then enrolled as an associate of the society. She kept her membership in the society through 1940.

Sarah E. Cronin lived in Forest Hills, Queens, before her retirement in 1942, when she moved to Daytona Beach, Florida. She was eighty-one when she died in Halifax Hospital in Daytona Beach in 1958.

Thesis and dissertation:

1905 Mathematical theory of diffusion. MS thesis, University of Iowa.

1917 Geometric properties completely characterizing all the curves in a plane along which the constrained motion is such that the pressure is proportional to the normal component of the acting force. PhD dissertation, Columbia University, directed by Edward Kasner. Printed by Press of the New Era Printing Co., Lancaster, PA.

Reference to: "Dr. Sarah E. Cronin." (Obituary) *New York Times*, 4 Oct 1958.

Other sources: PhD dissertation vita 1917; Society of Actuaries Library; communications with University of Iowa Archives and Iowa State University Archives; US Census 1870, 1880, 1900 IA, 1920 NY; Florida death certificate.

Last modified: December 9, 2008.

CUMMINGS, Louise D. November 21, 1870–May 9, 1947.
University of Toronto (BA 1895, MA 1902), Bryn Mawr College (PhD 1914).

Louise Duffield Cummings was the daughter of Anne (Morison), born in about 1836 in Scotland, and James Cummings, born in about 1821 in Ireland. She was born in Hamilton, Ontario, Canada, where at the time of the 1881 Canadian census her father's occupation was described as collector. At that time, five children in the household were listed: James, 23; Richard, 22, a teacher; Alice, 20; Sam, 15; and Louisa, 10.

Louise's brother Richard earned a BA from the University of Toronto in 1878 and became a physician in Wayne, Michigan. Alice was a pianist who taught at one time at St. Margaret's College for Ladies, a private high school in Toronto. Samuel, who graduated in medicine from Toronto with an MB in 1888, became a surgeon who was noted for his pioneering work with X-rays for the diagnosis and treatment of medical problems.

Louise Cummings attended public schools and the Hamilton Collegiate Institute in Hamilton, Ontario, before being admitted to the University of Toronto in 1889. After attending in 1889–90, she was away for a year. In 1891–92, she returned to Toronto as a second-year student and remained 1892–93 as a third-year student. She was not in attendance 1893–94 but was a fourth-year student in 1894–95. She won the William Mulock scholarship in mathematics her second year and half of the physics scholarship her third year. Cummings received her bachelor's degree from Toronto in 1895 with first class honors in mathematics.

Cummings spent most of the next five years in graduate study in mathematics at four different institutions. Although she was not listed as a graduate student, she continued her study at Toronto in 1895–96 under the direction of Alfred T. DeLury, who was later to become head of the department. The next year, 1896–97, she held a Bennett fellowship, one of two given annually to women in the graduate school (then called the department of philosophy) for study at the University of Pennsylvania. In 1897–98 she was a student at the University of Chicago, and the following year she was a resident fellow in mathematics at Bryn Mawr College. She supervised examinations at Toronto in 1897 and held a fellowship by courtesy in mathematics during the second semester of 1899–1900 at Bryn Mawr. During her first year at Bryn Mawr she gave two presentations, on Galois fields and on graphical representation of groups, to the Mathematical Journal Club. Other speakers for the year included professors Scott and Harkness of Bryn Mawr and Morley of Haverford, and four students, including Grace Bareis and Emilie Norton Martin.

Cummings studied at the Ontario Normal College in Hamilton during the year 1900–01. She returned to Toronto in 1901 to continue her studies and to teach mathematics at St. Margaret's. Her master's degree was awarded by the University of Toronto in 1902.

In the fall of 1902, Cummings joined the faculty at Vassar College in Poughkeepsie, New York, where she remained until her retirement more than thirty-three years later. The other new member of the Vassar mathematics department that year was Elizabeth B. Cowley. While there Cummings was instructor 1902–15, assistant professor 1915–19, associate professor 1919–27, professor 1927–35, and professor emeritus after her retirement. She was on leave for the second semesters of 1931–32 and 1934–35.

Louise Cummings continued her studies at Bryn Mawr College at various times while on the faculty at Vassar. She was a graduate scholar during the first semester 1905–06 and during the second semester 1912–13, when she was in residence at Bryn Mawr for the academic year. She received her doctorate from Bryn Mawr in 1914 with subjects mathematics, applied mathematics, and physics. Both Henry Seely White of Vassar and Charlotte A. Scott of Bryn Mawr had a role in her dissertation work. White, who had earned his PhD at Göttingen in 1891, came to Vassar as professor in 1905 and remained until his retirement in 1936. In her dissertation vita Cummings acknowledges her indebtedness to Scott "for helpful criticism and unfailing interest in the preparation of this paper" and to White "who suggested . . . the subject of [the] dissertation." She published a dozen papers over twenty years, and her work is discussed in Hutchinson's 1977 article, "Women in Combinatorics." Two of her papers were coauthored with White, who was president of the AMS 1907–08, and Frank Nelson Cole, who was secretary of the AMS 1896–1920. This work was mentioned by E. T. Bell in his article on algebra in the *Semicentennial Addresses of the American Mathematical Society* and in T. S. Fiske's 1927 obituary of Cole in which he notes that "Miss Cummings developed the earliest examples" of a certain type (p. 775).

Cummings attended many meetings of the AMS and MAA and often gave presentations at the AMS meetings. In 1924 she was appointed to the MAA committee to formulate the details for awarding the newly established Chauvenet prize. She also attended the International Congress of Mathematicians (ICM) in Toronto in 1924 and in Zurich in 1932. She was given an honorary DSc degree by the University of Toronto at the university's centennial celebration in 1927. The Carnegie Foundation granted her a retiring allowance beginning February 24, 1936.

After suffering from severe arthritis for several years, Louise Cummings died in 1947 at the age of seventy-six at the home of her niece in Wayne, Michigan. She was buried in the Hamilton, Ontario, cemetery.

Organizational affiliations: AMS, MAA, AAAS.

Dissertation:

1914 On a method of comparison for triple-systems. PhD dissertation, Bryn Mawr College, directed by Charlotte Angas Scott. Printed version, 1914, Press of the New Era Printing Co., Lancaster, PA, reprinted from *Trans. Amer. Math. Soc.* 15:310–27.

Publications:

1913 Note on the groups for triple systems. *Bull. Amer. Math. Soc.* 19:355–56. Reviews: *JFM* 44.0263.04 (E. Lampe); *Rev. semestr. publ. math.* 22, pt. 1: 5 (D. J. Korteweg).

1914 On a method of comparison for triple-systems. *Trans. Amer. Math. Soc.* 15:310–27. Published version of PhD dissertation. Reviews: *JFM* 45.0349.02 (K. Böhm); *Rev. semestr. publ. math.* 23, pt. 1: 8 (P. Mulder). Presented by title to the AMS, New York City, 25 Apr 1914; abstract: *Bull. Amer. Math. Soc.* 20:514 #11.

1915 with H. S. White. Groupless triad systems on fifteen elements. *Bull. Amer. Math. Soc.* 22:12–16. Reviews: *JFM* 45.1264.02 (G. Szegö); *Rev. semestr. publ. math.* 24, pt. 2: 3 (D. J. Korteweg). Presented to the AMS, New York City, 24 Apr 1915; abstract: *Bull. Amer. Math. Soc.* 21:488 #12.

1917 with F. N. Cole and H. S. White. The complete enumeration of triad systems in fifteen elements. *Proc. Natl. Acad. Sci. USA* 3:197–99. Reviews: *JFM* 46.1431.04 (M. Plancherel); *Rev. semestr. publ. math.* 26, pt. 1: 12 (D. J. Korteweg). Presented as "Enumeration of all triad systems on fifteen letters" by title to a meeting of the National Academy of Sciences, Cambridge, MA, 13–15 Nov 1916. Also presented to the AMS: (1)

Providence, RI, 8 Sep 1914: by H. S. White as "Triple-systems on 31 letters; a reconnaissance," and by L. D. Cummings, read by H.S. White, as "The trains for 42 non-congruent triple-systems on 15 elements"; abstracts: *Bull. Amer. Math. Soc.* 21:69 #23 and #24; (2) New York City, 31 Oct 1914: by H. S. White as "Census of the triad system on 15 letters"; abstract: *Bull. Amer. Math. Soc.* 21:164 #5; (3) Palo Alto, CA, 4 Aug 1915: by title by F. N. Cole as "Note on the triad systems in 15 letters"; abstract: *Bull. Amer. Math. Soc.* 22:9 #15; and (4) New York City, 28 Oct 1916: by F. N. Cole as "Complete census of the triad systems in fifteen letters"; abstract: *Bull. Amer. Math. Soc.* 23:160–61 #7.

1918 An undervalued Kirkman paper. *Bull. Amer. Math. Soc.* 24:336–39. Reviews: *JFM* 46.0107.01 (G. Szegö); *Rev. semestr. publ. math.* 27, pt. 1: 4 (D. J. Korteweg). Presented as "The two-column indices for triad systems on fifteen elements" to the AMS, New York City, 27 Oct 1917; abstract: *Bull. Amer. Math. Soc.* 24:171 #2.

1919a The trains for the 36 groupless triad systems on 15 elements. *Bull. Amer. Math. Soc.* 25:321–24. Review: *Rev. semestr. publ. math.* 28, pt. 1: 2 (D. J. Korteweg). Presented to the AMS, Hanover, NH, 5 Sep 1918; abstract: *Bull. Amer. Math. Soc.* 25:55 #10.

1919b with F. N. Cole and H. S. White. *Complete Classification of the Triad Systems on Fifteen Elements.* Mem. Nat. Acad. Sci. USA, 14, no. 2. Part 1: Triad systems on 15 elements whose group is of order higher than unity, by H. S. White, 5–26. Part 2: Trains for triad systems on 15 elements whose group is of order higher than unity, by L. D. Cummings, 27–68. Part 3: Groupless triad systems on 15 elements, by H. S. White and L. D. Cummings, 69–72. Part 4: Structure as defined by interlacings, head, and semiheads; a complete census of triad systems in fifteen elements, by F. N. Cole, 73–80. Part 5: Sequences and indices for all groupless triad systems on 15 elements, by L. D. Cummings, 81–89. Presented to the AMS as noted in **1917**.

1925 A new type of double sextette closed under a binary (3,3) correspondence. *Bull. Amer. Math. Soc.* 31:266–74. Reviews: *JFM* 51.0492.02 (W. Fr. Meyer); *Rev. semestr. publ. math.* 32, pt. 2: 14 (D. J. Korteweg). Presented to the AMS, New York City, 25 Oct 1924; abstract: *Bull. Amer. Math. Soc.* 31:102 #2.

1928 Cyclic systems of six points in a binary correspondence. In *Proceedings of the International Mathematical Congress held in Toronto, August 11–16, 1924*, ed. J. C. Fields, 1:725–27. Toronto: Univ. of Toronto Press. Presented to the ICM, Toronto, August 1924. Review: *JFM* 54.0698.04 (H. Pietsch).

1932a Heptagonal systems of eight lines in a plane. *Bull. Amer. Math. Soc.* 38:700–702. Review: *JFM* 58.0676.02 (M. Steck). Presented to the AMS, New York City, 26 Mar 1932; abstract: *Bull. Amer. Math. Soc.* 38:193 #116.

1932b Hexagonal systems of seven lines in a plane. *Bull. Amer. Math. Soc.* 38:105–10. Reviews: *JFM* 58.0676.01 (M. Steck); *Zbl* 003.41005 (E. A. Weiss). Presented to the AMS, New York City, 31 Oct 1931; abstract: *Bull. Amer. Math. Soc.* 37:821–22 #359.

1933 On a method of comparison for straight-line nets. *Bull. Amer. Math. Soc.* 39:411–16. Presented to the ICM, Zürich, 5 Sep 1932; abstract: *Verhandlungen des Internationalen Mathematiker-Kongress: Zürich 1932* 2:188. Review: *JFM* 59.0610.01 (F. Schaale).

Abstract not listed above:

1922 Hesse's associated points and the Weddle surface. *Bull. Amer. Math. Soc.* 28:163 #28. Presented to the AMS, Toronto, ON, 28 Dec 1921.

References to: AmMSc 3–7; BiDWSci; BioWMath; Poggendorff 5–6; WomScSearch.

"Louise E. Cummings, Mathematician, Dies." *Toronto Star*, 10 May 1947.

"*De Mortuis.* Louise Duffield Cummings." Annual Report. Carnegie Foundation for the Advancement of Teaching. 1946–47, 41:68–69.

Hutchinson, Joan P. "Women in combinatorics." *AWM Newsletter* 7 (Jan-Feb 1977): 3–7.

Other sources: PhD dissertation vita 1914; Bryn Mawr College Archives; University of Pennsylvania Archives; University of Toronto Archives; Vassar College Archives; Bell,

"Fifty Years of Algebra in America"; Grinstein, "Some 'Forgotten' Women of Mathematics"; Kenschaft, "The students of Charlotte Angas Scott"; T. S. Fiske, "Frank Nelson Cole," *Bull. Amer. Math. Soc.* 33 (1927): 773–77; Canadian Census 1881.

Last modified: August 4, 2009.

DALE, Julia. October 16, 1893–January 13, 1936.
Transylvania University (BA 1914), University of Missouri (MA 1921), Cornell University (PhD 1924).

Julia May Dale was born in Shelbyville, Kentucky, the second of six children of Ida May (Todd) (b. 1867) and James Harrison Dale (1861–1937). Her parents were both natives of Kentucky and married in 1888. Her siblings were James Todd (1891–1953), Martha King (b. 1896), Lilly B. (1897–1989), Mary Ida (b. 1903), and William Pratt (1909–1971). Her father was a farmer and moved with the family to Alabama in 1916. Julia Dale's nephew, William Hardin True, noted that both parents were graduates of Eminence College, a small coeducational college in Kentucky that closed in 1895. He also wrote that James H. Dale served as Kentucky's secretary of agriculture and later became a prominent breeder of shorthorn cattle in Alabama.

Julia Dale graduated from Shelbyville High School in 1910. She then attended Transylvania University in Lexington, Kentucky, where she was a class secretary and was an officer in the local YWCA and the literary club. She was in charge of costumes for the girls' glee club and was a member of Chi Omega, a social sorority. The senior class prophecy foresees "Julia Dale, as irrepressible as ever, though she was 'Math Professor' at Yale" (The Crimson Yearbook 1914, Transylvania University Special Collections).

After graduating cum laude from Transylvania in 1914, Dale taught for a year in the high school in Aberdeen, Mississippi. In 1916–18 she taught at William Woods College, then a junior college for women, in Fulton, Missouri. The dean of the graduate school at the University of Missouri, Walter Miller, wrote Cornell's Dean Creighton on February 18, 1922, that he had "discovered her [at William Woods] and brought her to the University of Missouri on a graduate scholarship" (Julia Dale Folder, Box 61, Graduate School Records, Rare and Manuscript Collections, Cornell University Library). After a year on scholarship, Dale spent the following three years, 1919–22, as an instructor in mathematics at the University of Missouri while receiving her master's degree in 1921.

Dale was admitted to the graduate school at Cornell University as a candidate for the PhD in September 1922. She was a graduate scholar in mathematics 1922–23 and an Erastus Brooks fellow in mathematics 1923–24. The address she used for the December 1924 membership list of the AMS was the Cornell chapter of Chi Omega, her sorority as an undergraduate at Transylvania University.

After receiving her PhD in 1924, having written a dissertation in analysis and with minors in geometry and physics, Dale was an instructor for a year at the University of Oklahoma. While there she also volunteered at nearby Native American reservations. From 1925 until 1930, Dale was head of the mathematics department at Delta State Teachers College (now Delta State University) in Cleveland, Mississippi. She was active in the MAA and was secretary-treasurer of the Louisiana-Mississippi Section in 1929. She was an avid bridge player, did needlepoint, was interested in athletics, and helped coach the women's basketball team at Delta State.

In 1930 Dale moved to Duke University, where she was an assistant professor and head of the women's division of mathematics at Duke University. "It is said

that her chief motive in reluctantly leaving Delta State was to accompany her brother, Billy, then convalescent from a serious illness, who had prepared at [Delta State] to enter upon graduate study at Duke" ("Recording the Life of Delta State Teachers College"). Her brother made his home with her and subsequently received his doctorate in history from Duke in 1941. While at Duke, Dale taught a variety of classes including some in the graduate school. For example, the announcements for 1934–35 indicate that she was scheduled to teach courses in Fourier's Series and Spherical Harmonics, Infinite Series, and Algebraic Geometry.

Julia Dale died in 1936 at age forty-two in the Duke University hospital of renal failure after suffering from chronic kidney disease for some time. It was reported in a letter of September 7, 1976, from W. M. Causey of the University of Mississippi to Professor Miller at Transylvania that she was to have been married to Dr. W. W. Elliot, a professor of mathematics at Duke University. (Transylvania University Special Collections) Elliot had been a fellow graduate student and Hurwitz advisee at Cornell. Dale was survived by her parents, two brothers, and three sisters. Her remains are interred in Greensboro, Alabama.

In the spring of 1938 friends and relatives established the Julia Dale Memorial Fund at Duke; the income from this fund supports the Julia Dale Prize awarded annually by the Department of Mathematics to a mathematics major (or majors) on the basis of excellence in mathematics.

Organizational affiliation: MAA.

Thesis and dissertation:
1921 Comparison of approximation methods. MA thesis, University of Missouri. Typescript.
1924 Some properties of the exponential mean. PhD dissertation, Cornell University, directed by Wallie Abraham Hurwitz. Typescript. Printed version, 1925, reprinted from *Amer. J. Math.* 47:71–90.

Publication:
1925 Some properties of the exponential mean. *Amer. J. Math.* 47:71–90. Published version of PhD dissertation. Reviews: *JFM* 51.0181.04 (E. Kamke); *Rev. semestr. publ. math.* 32, pt. 1: 2 (E. B. Cowley).

Presentations:
Application of the exponential mean to Fourier's series. Presented to a meeting of the MAA, Shreveport, LA, 4–5 Mar 1927.
Applications of the exponential mean to Fourier's series. Presented to a meeting of the MAA, Columbia, SC, 15–16 Apr 1927.

References to: AmMSc 5–6.
"Miss Julia Dale Is Claimed by Death." *Durham Morning Herald*, 14 Jan 1936.
"Miss Julia Dale Passes at Duke." *Durham Sun*, 14 Jan 1936.
"Recording the Life of Delta State Teachers College." *Miss Delta*, 20 Jan 1936. Includes "An Appreciation of Dr. Julia Dale," read 15 Jan 1936, at Assembly Memorial Exercises, Delta State Teachers College, Cleveland, MS, by William H. Zeigel, Dean of Faculty.
True, William Hardin. "A 'Remembrance' of Professor Julia Dale."

Other sources: Rare and Manuscript Collections, Cornell University Library; Duke University Archives; communications with Transylvania University Special Collections, University of Oklahoma Office of the Senior Vice President and Provost, and with Virginia Knight; US Census 1900, 1910 KY, 1920, 1930 AL; North Carolina death certificate; SSDI.

Last modified: December 16, 2008.

DARKOW, Marguerite D. November 12, 1893–December 9, 1992.
Bryn Mawr College (BA 1915), University of Chicago (MA 1923, PhD 1924).

Marguerite Daisy Darkow was the second of three daughters of Flora (Singer) (1867–1942) and Martin Darkow (1856–1928). Her mother, born in Vienna, studied in private schools there; she learned German, French, English, a little Italian, and studied piano from a well-known teacher there. Martin Darkow was born in Riga, then in Russia. He studied violin as a boy and learned piano and organ. He attended college in Vienna. Flora Singer and Martin Darkow were married in 1888, and their first daughter, Angela Charlotte (1889–1943), was born in Vienna. They immigrated to the United States in about 1891, and Marguerite was born in Philadelphia two years later. The youngest daughter, Felice Evelyn (1898–1989), was also born in Philadelphia. Martin Darkow's occupation was listed as doctor in 1900, newspaper editor in 1910, and music teacher in 1920. Both Flora and Martin Darkow taught piano, but for the most part, he earned his living as a music and theatre critic for a German language newspaper.

In the mid-1910s, Martin Darkow was managing editor of a socialist German-language newspaper, the Philadelphia *Tageblatt*, that reported the war news from a German perspective. In September 1917 he, along with others connected with the newspaper, was indicted and tried for treason and for violation of the Espionage Act for making false statements to help the enemy. These charges were based on articles and editorials that appeared after the United States had declared war on Germany in early April 1917. In 1918 Darkow was acquitted on the treason charge but was convicted on the other charges. He received a five-year sentence that he appealed. Even though the Supreme Court upheld the conviction in March 1920, Darkow was never imprisoned and was pardoned by President Woodrow Wilson in June that year.

All three daughters earned higher degrees. Angela Darkow earned a BA in 1911, an MA in 1912, and a PhD in Greek literature in 1914 from Bryn Mawr. She taught Greek and Latin for several years in private high schools, later worked as an actuary, made and sold jam and fine embroideries during the Depression, was a bookkeeper, worked temporarily for the US Bureau of Labor Statistics, and died of cancer after a long illness. Felice E. Darkow received her BA in 1920 from the University of Pennsylvania and her LLB from the law school there. She had a variety of positions; the last two decades of her career she was with the US Department of Labor, first in Philadelphia and then in Washington, D.C. She was given the Distinguished Service Award upon her retirement.

Marguerite Darkow attended the E. Spencer Miller School in Philadelphia 1899–1907 and the Philadelphia High School for Girls 1907–11 before entering Bryn Mawr College in 1911. During her four years at Bryn Mawr she held several scholarships. She was First Bryn Mawr Matriculation Scholar for Pennsylvania and the Southern States 1911–12, Simon Muir scholar 1911–15, James E. Rhoads junior scholar 1913–14, and Maria L. Eastman Brooke Hall memorial scholar 1914–15. She graduated in mathematics and physics in 1915 and led the list of honor students. As the student with the highest average, Darkow was awarded a Bryn Mawr European fellowship for 1915–16; a Philadelphia newspaper reported that she had attained the highest average of any Bryn Mawr student since 1900. Her mother's cousin, the philosopher

Edmund Husserl, was then at Göttingen and encouraged her to come there to study, but she delayed using the fellowship because of the war in Europe.

In 1915–16 Darkow taught mathematics and science at Tudor Hall, a private school for girls in Indianapolis. During the summer of 1916 she studied at the University of Pennsylvania before entering the Johns Hopkins University that fall. She was a graduate student and fellowship holder in physics and mathematics 1916–17, during which she had courses in higher geometry, theory of functions, and theory of mechanics of physical optics. In the summer of 1917, she did statistical work for the children's bureau of the US Department of Labor. In 1917–18 she returned to teaching mathematics and science, this time at Rogers Hall in Lowell, Massachusetts, and the following year, 1918–19, she did astronomical research at the Leander McCormick Observatory at the University of Virginia. During several summers she worked as both a private tutor and as a tutor for fall college entrance exams at tutoring camps in New England. From 1917, and continuing into the 1920s, Darkow's father was often mentioned in the news making it difficult for her to pursue a normal career. On April 20, 1917, a few weeks after the United States entered the war against Germany, M. Carey Thomas, president of Bryn Mawr, wrote to Charlotte Scott, head of the mathematics department:

> I should not be willing to nominate Miss Darkow for any position in Bryn Mawr College. . . . I am particularly anxious that the question should not be brought up as I think that it might hurt her future career as a teacher. I should also not be willing for her to correct examination papers. I do not wish to bring her into connection in any way with Bryn Mawr College. (M. Carey Thomas Papers, microfilm reel 137, LXII, 138)

Although Thomas does not explain the reasons behind her attitude toward Darkow, the proximity of Bryn Mawr to Philadelphia would have made it likely that Thomas was already aware of the writing that later led to Martin Darkow's indictment for treason. Furthermore, other of Thomas's official papers of the time have been described as including "her efforts to assure that German propaganda be banned from the [Bryn Mawr] campus" (M. Carey Thomas Papers Guide and Microfilm Edition, Reel 137: M. Carey Thomas Official Papers; Letterbook no. 62. February 17, 1917 - January 3, 1918).

In 1920 Darkow was living in her parents' home in Philadelphia. She began working in the actuarial department of the Provident Life Insurance Company in Philadelphia in 1919 or 1920 and passed section A, part I, of the Actuarial Society of America examinations in May 1920. She passed part II of the associate examination in May 1921 and part III in May 1922.

Darkow left her position at Provident in 1922 to enter graduate school at the University of Chicago with a fellowship. She earned her master's degree in 1923 and continued another year at Chicago with a fellowship. She received her PhD in August 1924 with a dissertation written under the direction of L. E. Dickson. The results in her dissertation and in her 1927 paper in the *Annals of Mathematics* were cited in papers through at least 1940. In 1924–25, she traveled in Europe and finally used the European fellowship awarded by Bryn Mawr in 1915 to study at the Sorbonne in Paris. During this trip she visited Edmund Husserl, who was then at Freiberg and who again urged her to go to Göttingen.

Darkow was appointed assistant professor at Indiana University in Bloomington in 1925, and her appointment was terminated after two years. Correspondence from the time reveals issues or misunderstandings. The university president wrote that her appointment was originally a one-year appointment to replace a faculty member on leave. Darkow responded that nothing in the original appointment letter indicated that that was the case. She also noted that L. E. Dickson, her advisor at Chicago, recommended at the time that she give up the National Research Council fellowship to which she had been appointed and take the Indiana position instead, and that he would not have done so for a one-year position. There is a further question of whether a report to the president that she was a reader of the *American Mercury* magazine and an admirer of H. L. Mencken contributed to the dismissal. Darkow clearly felt that it had (President's files, Indiana University Archives). In any case, the following year, 1927–28, she was an instructor at Pennsylvania State College.

In the fall of 1928 Darkow began her career at Hunter College in New York, where she was instructor 1928–30, assistant professor 1928–42, associate professor 1942–56, professor 1956–59, and professor emeritus after her retirement in 1959. She continued her study of mathematics at the University of Chicago in summer 1938 and studied statistics at the University of Michigan the following two summers. In June 1940 Darkow indicated in a letter to Helen Owens that she had "a short paper, 'Generalized Center-circles,' in search of a publisher" (Owens Papers). In that same letter, she also commented on women in mathematics noting that women spend time on "minor domestic duties that certainly hamper their energies." Nonetheless, she indicated that "if we exclude the first-rate Mathematicians, I believe we will find many women who can compete with men in the second rank, as teachers, statisticians, etc." The following year Darkow and a colleague at Hunter, Mary K. Landers, wrote a preliminary edition of a textbook they called *Elementary Mathematics*. Darkow sometimes served as faculty advisor of the Hunter College mathematics club and as director of the Hunter chapter of Pi Mu Epsilon.

Darkow was interested in bird watching, travel, flowers, photography, reading, and corresponding with friends. She knew Latin and Greek, read both German and French with ease, and taught herself Spanish and a little Italian after her retirement. She traveled frequently. She regularly contributed to charities and was a member of the American Civil Liberties Union and various anti-nuclear organizations. In 1936 she hosted Edmund Husserl's son, Gerhart, a law professor, and his son-in-law, Jakob Rosenberg, an art historian, when they came to the United States to escape from Nazi Germany. As established academics, both of these cousins had jobs waiting for them. In March 1940, a Jewish cousin who was fleeing Austria without a job in the United States listed Darkow's address as her destination on the manifest of alien passengers arriving in the United States.

In about 1950, Darkow became close friends with Edna Sheinhart (1923–1995), who had graduated from Hunter in the 1940s and was a research engineer. After Darkow's retirement they shared an apartment in New York, traveled together, and then shared a home in Berkshire County, Massachusetts. Sheinhart had bought a farm in Sheffield, and the renovated barn became their permanent home in 1972. Their last good trip was to Egypt in 1979. In about 1982 Darkow was diagnosed with Alzheimer's disease. She remained in her home and was cared for by Sheinhart

and a staff of care givers. Marguerite Darkow died in her home in 1992. She was ninety-nine. Her ashes were buried at the top of the hill on the premises.

A letter from Dorothy Garfein, a friend and executor of her estate, informing Bryn Mawr of Darkow's death, indicated that "as a tribute to her lifelong concern for wildlife and the environment a 215 acre tract of farmland and woods was donated in Marguerite's name to the Massachusetts Audubon Society." This gift formed the basis of a wildlife sanctuary in Sheffield, Massachusetts. It was first called the Mount Everett Wildlife Sanctuary but was opened to the public in 2007 as the Lime Kiln Farm Wildlife Sanctuary.

Organizational affiliations: AMS, MAA, IMS, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1923 A Riemann surface for the function $z = w - e \sin w$, $(0 \leq e \leq 1)$. MA thesis, University of Chicago. Typescript.
1924 Arithmetics of certain algebras of generalized quaternions. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series.* 3:3–6.

Publications:
1927 Determination of a basis for the integral elements of certain generalized quaternion algebras. *Ann. of Math.* 2nd ser., 28:263–70. Reviews: *JFM* 53.0120.03 (R. Brauer); *Rev. semestr. publ. math.* 34, pt. 1: 61 (W. A. Wythoff).
1929 (Editor) Sir William Rowan Hamilton: On Quaternions. In *A Source Book in Mathematics* ed. D. E. Smith, 677–83. New York: McGraw-Hill Book Co. Reprint: 1959. New York: Dover Publications.
1935 with L. S. Hill. On algebraic treatment of geometry on a spherical surface. *Scripta Math.* 3:234–46, 329–36. Review: *JFM* 61.1391.03 (M. Steck).
1941 with M. K. Landers. *Elementary Mathematics.* Prelim. ed. New York and Ann Arbor: Edwards Brothers.
1944 Review of *Mathematics Dictionary*, rev. ed., eds. G. James and R. C. James. *Scripta Math.* 10:186–88.
1957 Interpretations of the Peano postulates. *Amer. Math. Monthly* 64:270–71.

Abstracts not listed above:
1938 Generalized center-circles. *Bull. Amer. Math. Soc.* 44:786–87 #464. Presented by title to a meeting of the AMS, Richmond and Williamsburg, VA, 27–30 Dec 1938.
1947 with L. A. Aroian. The fourth degree exponential function. *Bull. Amer. Math. Soc.* 53:1128 #430 and *Ann. Math. Statist.* 18:609 #8. Presented by Dr. Aroian to the AMS and the IMS, New Haven, CT, 4 Sep 1947.

References to: AmMSc 6–8, 9P–11P; AmWom 1935–40.
"Student at Bryn Mawr Gets Highest Honor Since 1900." Unidentified Philadelphia newspaper clipping.
Obituary in "Class Notes." *Bryn Mawr Alumnae Bulletin*, Summer 1993.

Other sources: Owens questionnaire 1937; Owens Papers; Smithsonian questionnaire 1982 (prepared by Felice Darkow); communication with Dorothy I. Garfein (friend); Bryn Mawr College Archives and Alumnae Files; Society of Actuaries Library; communication with Indiana University Archives; M. Carey Thomas Papers (New Haven, CT: microfilmed by Research Publications, 1981); M. Carey Thomas Papers Guide and Microfilm Edition; Russell A. Kazal, *Becoming Old Stock: The Paradox of German-American Identity* (Princeton, NJ: Princeton University Press, 2004); *Edmund Husserl: Briefwechsel*, vol. 9, Familienbriefe (Dordrecht: Kluwer Academic Publishers, 1994); US Census 1900, 1910, 1920, 1930 PA.

Last modified: August 1, 2009.

DEAN, Mildred (Waters). February 17, 1904–September 11, 1981.
Goucher College (BA 1924), Johns Hopkins University (MA 1927, PhD 1929).

Mildred Caroline Somerset Waters was born in Baltimore, Maryland, the second of two daughters of Caroline F. (b. 1870) and Robert F. Waters (b. 1867) from Maryland. Her parents were married in about 1896, and her older sister, Ruth, was born in 1898. Robert Waters was proprietor of a feed store; in 1920 her sister was a kindergarten teacher.

Mildred Waters had her early education in public and private schools in Baltimore before doing her undergraduate work at nearby Goucher College. After her graduation in 1924, she was a graduate student in chemistry at the Johns Hopkins University in Baltimore for the year 1924–25. She transferred to the mathematics department in the fall of 1925, continued her work in residence at Johns Hopkins the next two years, and received her master's degree in 1927. Her master's essay, directed by Frank Morley, was the beginning of the work in inversive geometry that she was to continue for her PhD dissertation.

In the fall of 1927, Mildred Waters married Charles Earle Dean (1898–1993), who had received his PhD in physics that year from Johns Hopkins. He was born in South Carolina and had earned an AB from Harvard in 1921 and an MA from Columbia in 1923. Since his work as a technical writer with AT&T required a move to New York, Mildred Dean discontinued her course work at Johns Hopkins. She continued her graduate work by taking a full-time program at Columbia University from the summer of 1927 through the spring of 1928. She also continued to work on her dissertation, mainly on her own, with occasional visits to Baltimore for discussions with Morley. She took her oral examination at Johns Hopkins in January 1929 and received her doctorate in February with subordinate subjects chemistry and geological physics.

From 1929 until 1963, Charles E. Dean worked as a technical writer and editor for the Hazeltine Corporation in Little Neck, Queens, New York. During that period, the Deans raised a family, and Mildred Dean had various teaching positions in the New York area. A son, Robert Waters, was born in 1929, and a daughter, Margaret Lewis, was born in 1932. Mildred Dean taught part time at Brooklyn College 1931–33, at Queens College 1942–47, and at Adelphi College 1947–48. She was a temporary instructor at Hunter College, taught at Hofstra, and in 1971 reported that she had retired from her last position at Queens.

In 1963 the Deans moved to the Washington, D.C., area, where Mildred Dean participated in the Forum for Professionals and Executives, a study group, and volunteered for Travellers Aid in Union Station and in the accounting office for the American Cancer Society.

Having suffered from heart and lung ailments for some time, Mildred Waters Dean died at her home in Takoma Park, Maryland, at seventy-seven in 1981. She was survived by her sister, husband, children, and grandchildren. She is buried in Monocacy Cemetery in Beallsville, Maryland.

Organizational affiliations: Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1927 [Waters, M. C. S.] A configuration of six rectangular biquadratics. MA thesis, Johns Hopkins University, directed by Frank Morley. Typescript.

1929 Studies in inversive geometry, with reference to a special set of six points. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Typescript. See also **1930**.

Publications:

1930 A system of six rectangular biquadratics. *Amer. J. Math.* 52:585-600. Published version of PhD dissertation. Review: *JFM*, 56.0555.01 (W. Fr. Meyer).

1932 Review of *College Algebra*, by L. J. Rouse. *Amer. Math. Monthly* 39:423–24.

References to:

"Deaths: Dean, Mildred W." *Washington Post*, 13 Sep 1981.

"Dr. Mildred Waters Dean." (Obituary) *Baltimore Sun*, 13 Sep 1981.

Other sources: PhD dissertation vita 1929; Ferdinand Hamburger Archives, The Johns Hopkins University; communication with Goucher College alumnae office (via Rochelle Adler Effron); "Charles E. Dean, Engineer," *Washington Post*, 21 Nov 1993; US Census 1900, 1910, 1920 MD, 1930 NY; SSDI.

Last modified: July 19, 2009.

DELEVIE, Jeanette (Fox). January 13, 1912–July 29, 1997.
New York University (BS 1931), Yale University (PhD 1935).

Jeanette Fox was born in New York, New York, the second of four children of Sophie (Levy) (b. ca. 1885) and Jacob Fox (1874–1935). Her mother was born in New York; her father was born in Russia, immigrated to the United States as a young man, and was naturalized in 1905. They married in about 1906. According to census records, her father was in the grocery business in 1910 and was an electric broker in 1920. Later he was president of the Owners and Tenants Electric Company. The other children were Florence (1906–1999), who earned a PhD in psychology; Victor (b. ca. 1914); and Helen (b. ca. 1916). At some point her parents were divorced. Her mother was still living at the time of her father's death in 1935.

Jeanette Fox graduated from Erasmus Hall High School in Brooklyn and lived at home while attending Washington Square College of New York University, where she majored in mathematics and minored in physics. During her junior year, 1929–30, she studied at the University of Munich; she graduated from NYU in 1931. Fox studied at the University of Berlin 1931–32 and was a fellow in mathematics at Yale University 1932–35, where she was elected to Sigma Xi. In 1935 she received her doctorate, having written her dissertation under the direction of Oystein Ore.

In 1935 Jeanette Fox married Albert Sol Keston (1911–1992). Albert Keston, who was born in New York, received his bachelor's and master's degrees from the University of Michigan and a doctorate in chemistry from Yale in 1935. He taught chemistry at the City College of New York (CCNY) before joining the faculty at the New York University College of Medicine. Later he was at Mount Sinai School of Medicine. He was a physical chemist most noted for developing the glucose-sensitive tape used by diabetics to test sugar levels.

During the academic year 1938–39 Jeanette Fox Keston taught at Brooklyn College during the day as a substitute, that is, on an hourly wage. She was also an instructor in the evening session 1938–41. The first of her two children, a daughter, was born in January 1942. She again taught during the day as a substitute from January to June 1943. Her son was born in January 1944. The Kestons were separated when the children were young and divorced in 1950. Their daughter received a PhD in experimental psychology in 1967.

Jeanette Fox Keston was a temporary lecturer in a veterans' program at Hunter College 1946–48 and remained in a temporary position at Hunter the following year. The next two years, 1949–51, she was an assistant professor at Jersey City Junior College. Keston again taught at Brooklyn College starting in 1953; she was a substitute 1953–56 and a lecturer 1956–57. She then began her association with the mathematics faculty at CCNY. She remained until 1971, by which time it had become City College, CUNY. She was an instructor September 1957–December 1961, an assistant professor January 1961–December 1966, and an associate professor from January 1967 until her retirement in 1971. In the early 1960s, she coauthored two mathematics research papers with others at City College. She taught several upper level courses in her field of algebra as well as the course in abstract algebra in the graduate school of education. During Saturdays of the academic year 1963–64 she also taught an NSF-sponsored course in number theory for high school students. In 1964 she was joined at City College by Miriam B. Mazur, who had been a fellow graduate student at Yale, and who had earned her PhD there a year before Jeanette

Fox Keston. Until Mazur was hired, Keston was in charge of most of the courses related to the preparation of teachers and served as the department representative to the school of education as well as chairman of the departmental committee on teacher preparation.

While traveling in Europe, Jeanette Keston met, and later married, Solomon Delevie (1907–1992), a native of Pennsylvania who was living in San Francisco. They appear to have married at the end of the 1969–70 academic year, and Jeanette Delevie moved to California while she was on a sabbatical leave 1970–71. She was granted a waiver from the condition of returning after a sabbatical and retired. On June 25, 1971, Jean Delevie wrote to Fritz Steinhardt, then chairman of the mathematics department at City College that "meeting Sol [Delevie] was the start of a fairy tale and 'they lived very happily ever after.' It can happen in real life" (Keston, Jeanette Fox; Mathematics Department Faculty Personnel File, Archives and Special Collections Division of the CCNY Libraries). In 1997, at the age of eighty-five, Jeanette Delevie died at home in San Francisco of cardiorespiratory arrest as a result of coronary artery disease.

Dissertation:

1935 [Fox, J.] Existence of a Euclid algorithm in quadratic fields. PhD dissertation, Yale University, directed by Oystein Ore.

Publications:

1960 [Keston, J. F.] with F. Supnick and H. J. Cohen. On the powers of a real number reduced modulo one. *Trans. Amer. Math. Soc.* 94:244–57. Reviews: *MR* 22 #6777 (C. G. Lekkerkerker); *Zbl* 093.26003 (M. Cugiani).

1962 [Keston, J. F.] with F. Supnick. On the rational triangulation of a circle. *Proc. Amer. Math. Soc.* 13:768–70. Reviews: *MR* 25 #4403 (W. Moser) and *Zbl* 125.29605 (J. Szenthe).

Abstract not listed above:

1935 [Fox, J.] Finiteness of the number of quadratic fields with even discriminant and Euclid algorithm. *Bull. Amer. Math. Soc.* 41:186 #117. Presented to the AMS, New York City, 23 Feb 1935.

Other sources: Archives and Special Collections Division of the CCNY Libraries; Center for Research Libraries College Catalog Collection; "Jacob Fox," (Obituary) *New York Times*, 19 Dec 1935; US Census 1910, 1920, NY; California death certificate; SSDI.

Last modified: December 10, 2008.

DICKERMAN, Elizabeth Street. November 13, 1872–April 24, 1965.
Smith College (BA 1894), Yale University (PhD 1896).

Elizabeth Street Dickerman was born in West Haven, Connecticut, the daughter of Elizabeth Mansfield (Street) (1843–1926), born in New York, and George Sherwood Dickerman (1843–1937), of Connecticut. Her maternal grandfather was a minister who had graduated from Yale, and her father was a Congregational minister who earned a BA from Yale in 1865 and a BD from the Yale Divinity School in 1868. Her parents married in 1870 and had four children: Elizabeth Street; Sherwood Owen (1874–1930) and Amy Eliot (1879–1980), both born in Maine; and Alfred Deluce (1885–1920), born in Massachusetts. Her brother Sherwood received a BA from Yale in 1896, a PhD from Halle in 1909, and was a professor of Greek at Williams College. Her sister graduated from Smith College in 1900, attended the Yale School of Music the following year, and later married. Her brother Alfred attended Washington and Lee University.

Elizabeth Street Dickerman graduated from high school in Amherst, Massachusetts, in 1890 before entering nearby Smith College, where her chief subjects of undergraduate study were mathematics, philosophy, social science, French, German, and music before her graduation in 1894. She entered Yale University that autumn and studied with Hubert A. Newton, J. Willard Gibbs, Andrew W. Phillips, Irving Fisher, and James Pierpont. She held a scholarship there her second year and received her PhD in 1896 with no advisor designated. The following year, 1896–97, she took a course on linear differential equations with Pierpont, and in 1899–1900 she attended a course on thermodynamics and properties of matter given by Gibbs.

In the decade after receiving her PhD, Dickerman was primarily occupied with private teaching. She also traveled in Europe for four months in 1897 and again in 1902 and was fluent in French, German, and Italian. The next several years she had formal teaching positions. She taught mathematics at Greenwich Academy 1904–05; substituted as professor of mathematics at the College for Women of Western Reserve University in Cleveland, Ohio, 1906–07; and taught mathematics and psychology at Ingleside School in New Milford, Connecticut, 1907–13. In 1910 she registered with the Smith College faculty committee on recommendations seeking an appointment either in college teaching or administrative work. At this time she was a member of the New England Association of Teachers of Mathematics.

After 1914 Dickerman was mainly engaged in literary work and some private teaching while living in New Haven. During World War I, she selected and translated war poems for a calendar, *Songs of our Allies*, the proceeds of which were to go to wounded French soldiers. She served as assistant to the editor of the *Yale Review* in 1917. Her literary work includes translations of poetry from the French, books of poetical reminiscences of her travels, and various other articles. She made a trip to Bermuda in 1921 and followed that with a book of verse about the trip. In 1924 she conducted a Round Table on Industrial Relations in New Haven in connection with the AAUW.

Dickerman reported in 1936 that she was devoting time to the care of her father who was seriously ill. Her primary residence before his death in 1937 was her family home in New Haven; after his death she moved to an apartment there. From the mid-1920s, she also maintained a summer home on Squirrel Island, Maine, where her maternal grandparents had also had a home. In 1938, at sixty-five, she made a

trip to France. During her last few years, she lived most of the time at the home of her sister, Amy Humstone, in Greenwich, returning to her apartment in New Haven for a few weeks each spring and fall.

Elizabeth Dickerman died in Greenwich, Connecticut, in 1965 after a month in the hospital following surgery for a broken hip. She was ninety-two. After services at the United Church on the Green in New Haven, interment followed in the Centerville Cemetery in Hamden, Connecticut.

Organizational affiliations: AAAS, AAUP, Phi Beta Kappa.

Dissertation:
1896 Curves of the first and second degree in $x\ y\ z$ where $x\ y\ z$ are conics having two points in common. PhD dissertation, Yale University.

Publications:
1915 (Translator from the French) *Songs of Brittany: Chanson de chez nous of Théodore Botrel*. Boston, MA: Richard G. Badger.
1916 (Translator from the French) The song of the blowing wind [by Anatole Le Braz]. *Poet Lore* 27:357–58.
1917a Charles Péguy. *Poet Lore* 28:246–47.
1917b (Translator from the French) Saint Genevieve by Charles Péguy. *Poet Lore* 28:246.
1918a *Folk-songs of Brittany, selections from Théodore Botrel's Chanson de la Veillee*. New Haven, CT: Tuttle, Morehouse & Taylor. Written in English verse adapted to the original Breton airs.
1919a (Translator from the French) Du Guesclin, a dramatic poem by Théodore Botrel. *Poet Lore* 30:159–207.
1919b (Translator from the French) Madelon: the famous song of the French Poilus. *Poet Lore* 30:469–70.
1920 Centurions of France. *Poet Lore* 31:243–52.
1921 Emilie Marechal: a soldier-poet of Belgium. *Poet Lore* 32:136–39.
1922 (Translator from the French) Four poems of Chang-Wou Kiem 1879. *Poet Lore* 33:158.
1923 *A Spanish Journey.* (Poetry) New Haven, CT: Tuttle, Morehouse & Taylor.
1954 Portrait of two sisters, Emily and Lavinia Dickinson. *Smith Alumnae Quarterly* (February): 79.

References to: BioWMath, WomWWA.
"Elizabeth Street Dickerman, B.A. Smith College 1894." *Alumnae Graduate School Yale University 1894-1920*. New Haven, CT: Yale University, 1920.
"Dickerman, Elizabeth Street." (Death notice) *New York Times*, 26 Apr 1965.
"Elizabeth Dickerman." (Obituary) *Smith Alumnae Quarterly* (Summer 1965), 262.

Related manuscript material:
Elizabeth S. Dickerman Papers Relating to Emily Dickinson. Yale Collection of American Literature, Beinecke Rare Book and Manuscript Library, Yale University.

Other sources: Owens questionnaire 1937; Williams Papers; Smith College Alumnae Office; Smith College Archives; Manuscripts and Archives, Yale University Library; *Yale University Obituary Record 1937–1938* (George Sherwood Dickerman, BA 1865); E. M. Dickerman, *A Memorial of Two Lives* (Amherst, MA: J. E. Williams, 1888); US Census 1880 ME, 1900, 1910, 1930 CT.

Last modified: March 6, 2009.

DIMICK, Alice (McKelden). December 6, 1878–July 13, 1956.
Columbian University (BA 1899), University of Pennsylvania (MA 1900, PhD 1905).

Alice Madeleine (Elsie) McKelden was born in Washington, D.C., the seventh of nine children of Alice Maria (McIntosh) (1843–1932) and William Blagrove McKelden (1842–1905), both natives of the District of Columbia, who married in October 1864. Her father worked for the US Treasury Department and was cashier of the treasury at the time of his death. Her mother was a teacher in the public schools of Washington before her marriage. There were seven daughters and two sons in the family. They were Margaret Vernon Blagrove (1865–1942), a registered nurse; Clara Alexander (April 1867–July 1867); Edith Parthenia (1869–1941); Louise Beatrice (1872–1947); Frederick Eastman (January 2, 1875–February 26, 1875); Mary (Marie) Christie (1876–1942); Alice Madeleine; William Blagrove Jr. (1881–1938); and Irma Eldridge (1885–1966).

Alice McKelden graduated from Central High School in Washington, D.C., in 1895. She then received by competitive examination a four-year scholarship to Columbian (now George Washington) University. She received medals in both mathematics and Greek and graduated from Columbian in 1899. She entered the University of Pennsylvania as a university scholar in mathematics in October 1899. During 1899–1900 she took seven courses in mathematics, six in Greek, and one in classical philology, and passed written examinations in Greek, in modern analytical geometry, and in complex variables before receiving her master's degree in 1900. McKelden studied at Harvard in the summer session 1901 and at Johns Hopkins in 1901–02, although it is not clear what courses she may have attended. In 1902–03 and 1903–04 McKelden was a Moore fellow and a Bennett fellow, respectively, at the University of Pennsylvania. She finished her work for the PhD with a dissertation in the theory of finite groups in 1905.

After receiving her doctorate, McKelden taught in at least one preparatory school and at the Philadelphia High School for Girls. On June 12, 1907, Alice McKelden married Chester Edward Dimick. Dimick was born in New Hampshire in 1880, received a BA in 1901 from Harvard and an MA in 1907 from the University of Pennsylvania. He taught in the Louisville School for Boys 1901–03 and at the University of Pennsylvania 1903–06. In 1906 Chester Dimick became an instructor of mathematics on the USS *Chase* with the US Revenue Cutter Service, later the US Coast Guard. After the wedding, the Dimicks sailed for Europe, where they traveled during the summer. From the time of their marriage, Chester E. Dimick was a member of the mathematics department faculty at what later became the United States Coast Guard Academy. He joined the faculty there as a civilian instructor, and they lived in Baltimore when the academy was in Arundel Cove, Maryland. In 1910 the academy moved to New London, Connecticut, and they lived in the New London area for the next thirty-five years. Chester Dimick was later commissioned a commander and was a captain at the time of his retirement; he served as professor and dean. A mathematics award in his name was established by Alice M. Dimick in 1944, and Dimick Hall on the campus of the academy is named for him. There were no children of the marriage.

Alice Dimick inherited an interest in genealogy from her mother who collected information on the McKelden and McIntosh families. Dimick's "black morocco bound

notebook" summarizing genealogical data was the basis of a volume edited for distribution to the family in 1972 by James L. Frink, the husband of her youngest sister (McKelden and Dimick, i).

Alice M. Dimick occasionally served as a substitute teacher in the high school in New London and as a private tutor, but was mainly involved with various social, church, and civic volunteer activities. She belonged to the social sorority Kappa Kappa Gamma and was a member of its subdivision of alumnae whose husbands were in the US military service. She belonged to the Daughters of the American Revolution, the International Association of University Women, and was involved with the YWCA. She was president of the New London Unit of the League of Coast Guard Women, vice chairman of the New London Unit of the Coast Guard League, and president of the New London Tuesday Book Club.

In addition to her local activities, Dimick served on the national level with the Girls' Friendly Society, an international religious, educational, service, and creative arts group, affiliated with the Episcopal Church, for girls and young women. She served as national secretary in the late 1930s, on the national board of directors, and as national president; she contributed articles on the society to the society's *Record*. The Dimicks vacationed in Hawaii in summer 1939.

After Chester Dimick's retirement as head of the mathematics department at the US Coast Guard Academy in 1945, the Dimicks moved to Tryon, North Carolina. Chester Dimick died in January 1956, and Alice Dimick died in Tryon at age seventy-seven six months later. They are buried at Arlington National Cemetery.

Dissertation:

1905 [McKelden, A. M.] Groups of order 2^m that contain cyclic sub-groups of order 2^{m-1}, 2^{m-2}, and 2^{m-3}. PhD dissertation, University of Pennsylvania. Printed version, 1906, NY, reprinted from *Amer. Math. Monthly* 13:121–36.

Publications:

1906 [McKelden, A. M.] Groups of order 2^m that contain cyclic subgroups of order 2^{m-3}. *Amer. Math. Monthly* 13:121–36. Published version of PhD dissertation.

1907 [McKelden, A. M.] Problems that arise in the teaching of elementary algebra in the first year high school course. *Sch. Sci. Math.* 7:363–71.

References to:

"Washington Girl's Success. Miss Alice Madeleine McKelden Now a Doctor of Philosophy." *Washington Post* 18 Jun 1905.

"Arlington Rites Tuesday for Alice McK. Dimick." *Washington Post and Times Herald*, 16 Jul 1956.

Other sources: Owens questionnaires 1937, 1940; Ferdinand Hamburger Archives, The Johns Hopkins University; University of Pennsylvania Archives; Arlington National Cemetery; communication with George Washington University Alumni Records Office; Alice Maria McIntosh McKelden and Alice Madeleine McKelden Dimick, *Something about the McKeldens and the McIntoshs and Other Ancestors*, ed. James L. Frink (Greensboro, NC: Office Service Company, 1972); US Census 1880, 1900 DC, 1910 MD, 1920, 1930 CT.

Last modified: January 15, 2011.

EARLY, Madeline (Levin). April 1, 1912–January 20, 2001.
Hunter College (BA 1932), Bryn Mawr College (MA 1933, PhD 1936), New York University (Bellevue Schools of Nursing) (BS 1945).

Madeline Levin was born in Brooklyn, New York, the youngest child of Dora (Siegal) (1875–1962) and Hyman Levin (1870–1936). Both of her parents were born in Grodno, Russia (Lithuania), and emigrated from there in the early 1890s. They married in 1892 and had seven children: Mitchell Julius (1893–1958), Bertha (1895–1978), Rose (1897–1973), Anne (1902–1996), Florence (1905–1990), Harold (1909–1999), and Madeline. In January 1920, the family household in Brooklyn contained her parents, naturalized in 1898, and the five younger children. Her father's occupation was listed as house painter.

Madeline Levin attended public schools in New York City for her primary, secondary, and collegiate education. She attended Hunter College as a scholar of the University of the State of New York before graduating magna cum laude as a mathematics major at age twenty. While at Hunter she was a member of Pi Mu Epsilon; Theta Mu Tau, a physics honorary society; and the mathematics club. She also served as an officer, frequently treasurer, in various other college clubs. According to Ann Early, her daughter-in-law, she credited Lao Genevra Simons, chairman of the Hunter mathematics department when she was there, as the one "who sponsored [her] career."

After her graduation in 1932, Levin went immediately to graduate school at Bryn Mawr College. She was a college scholar 1932–34 and a college fellow in the fall of 1934. A paper in algebraic topology coauthored by Levin and William W. Flexner, her advisor at Bryn Mawr, appeared in 1934. Flexner joined the faculty at Cornell University in 1934, and Levin spent the spring semester of 1935 at Cornell as a fellow from Bryn Mawr. She received a master's degree in 1933 and her doctorate in 1936 from Bryn Mawr.

In the fall of 1935, at age twenty-three and a year before completing the work for her doctorate, Levin joined the faculty of her alma mater, Hunter College, as tutor. She remained as tutor through 1938, and then was appointed instructor. It was a lonely time because of the heavy work load and because she was so much younger than the other faculty. She did post-doctoral study at the University of Chicago in the summers of 1937 and 1938. From her initial appointment at Hunter through early 1942, Levin regularly attended meetings of the AMS in New York City.

During the early years of World War II, Levin took a military leave of absence to attend the Bellevue Schools of Nursing and to take additional course work to earn a bachelor's degree in nursing from the affiliated New York University. She was appointed ensign in the Naval Reserve in March 1945 and in April was directed to the US Naval Hospital, St. Albans, on Long Island. The following year she was transferred to Guam, where she served for nearly a year before being released from active duty in March 1947. Then, using the GI Bill, Levin did post-doctoral study at the University of Michigan during 1947–48. It was there, in October 1947, that she met Harold C. Early (1912–2000), a native of Michigan who had graduated from Michigan State University in 1939 with a major in mathematics and who later did graduate work at the University of Michigan. During World War II, he was part of a

team at Harvard that developed a device for jamming enemy radar. After the war, he was a member of the electrical engineering faculty at the University of Michigan.

Levin returned to Hunter in 1948 but formally resigned her position as instructor in February 1949. She married Harold Early on April 8, 1949, and moved back to Ann Arbor, Michigan. The Earlys had one child, Robert Eric, born in July 1951. They divorced in July 1958.

In 1956 Madeline Early joined the faculty of Eastern Michigan University in nearby Ypsilanti, where she taught for the next nineteen years. She was assistant professor 1956–59, associate professor 1959–67, and professor from 1967 until her retirement in 1975, when she became professor emeritus. In addition to her work on various department, college, and university committees, she served as associate head of the department for some time. A letter at the time of her retirement indicates how well she was thought of at Eastern Michigan. Her daughter-in-law noted that Early "was an extremely dedicated and responsible teacher with a strong commitment not to miss class. She passed this on to Bob [her son, a mathematics professor]. They would joke that she would arrange not to die during the school year, so that he wouldn't have to miss [class]." Ann Early also said that her mother-in-law was "very precise in her diction and habits. She kept everything she could very orderly. She could be very intense .... On the other hand, she had a wry sense of humor and enjoyed being teased."

In the late 1970s, Early sold her house in Ann Arbor and moved into an apartment at the Glacier Hills retirement community, also in Ann Arbor. She stayed active and took a group trip once or twice a year until she was in her eighties. Madeline Early died in 2001 at age eighty-eight at St. Joseph Mercy Hospital in Ann Arbor, after having been a resident of Glacier Hills Nursing Center. She was survived by her son, daughter-in-law, and grandson and was buried at Fort Custer National Cemetery in Augusta, Michigan.

Organizational affiliations: AMS, AAUP, Phi Beta Kappa, Pi Mu Epsilon.

Dissertation:

1936 [Levin, M.] An extension of the Lefschetz intersection theory. PhD dissertation, Bryn Mawr College, directed by William Welch Flexner. Printed version, 1937, Lima, Peru, reprinted from *Rev. Cienc.* (*Univ. Nac. Mayor San Marcos, Lima*) 39:93–118.

Publications:

1934 [Levin, M.] with W. W. Flexner. The intersection of arbitrary chains and its boundary. *Proc. Natl. Acad. Sci. USA* 20:666–68. Reviews: *JFM* 60.0515.01 (E. Pannwitz); *Zbl* 010.37603 (H. Seifert).

1937 [Levin, M.] An extension of the Lefschetz intersection theory. *Rev. Cienc.* (*Univ. Nac. Mayor San Marcos, Lima*) 39:93–118. Published version of PhD dissertation. Reviews: *JFM* 64.1280.04 (E. Schulenberg); *Zbl* 018.27803 (A. W. Tucker).

References to: WhoAmW 8–9.

"Early, Madeline (Levin) [of] Ann Arbor, MI." (Obituary) *Ann Arbor News*, 23 Jan 2001.

Other sources: Owens questionnaires 1937, 1940; correspondence with Robert and Ann Early, 1999–2002; Cornell University Department of Mathematics files; US Census 1910, 1920, 1930 NY; SSDI.

Last modified: August 21, 2010.

EPSTEIN, Marion (Greenebaum). June 14, 1915–March 24, 2014.
Barnard College (BA 1935), Bryn Mawr College (MA 1936, PhD 1938).

Marion Belle Greenebaum is the third of three daughters of Anna (Rheinhold) (1876–1927), born in Germany, and Milton Greenebaum (1876–1976), born in Baltimore, Maryland. Her mother, who attended the Normal College of the City of New York (now Hunter College), was a teacher; her father, who attended the New York City public schools and was self-educated, was an importer and exporter. Her parents married in October 1907. Their three daughters were born in Brooklyn, and all later earned bachelor's degrees from Barnard College. Marion Greenebaum's sisters, Celine (1910–2003) and Helen (b. 1912), both did graduate studies in social work and became licensed social workers.

Marion Greenebaum attended Erasmus Hall High School in Brooklyn 1927–31 and was awarded the Julia M. Dennis memorial scholarship at the time of her graduation. She was also recognized as one of two obtaining the highest average in mathematics in a graduating class of more than five hundred. She entered Barnard College at age sixteen and graduated four years later with a major in mathematics. Athletics were among her activities at Barnard, and in the spring of her senior year she received a senior service award and numerals in basketball and tenikoit (also known as ring tennis) from the Barnard College Athletic Association. She was later the fund chair for her class.

After receiving her bachelor's degree in 1935, Greenebaum immediately began her graduate work in mathematics at Bryn Mawr College; she earned her master's degree a year later and her doctorate two years after that, at age twenty-three. She held a graduate scholarship in mathematics 1935–37 and a resident fellowship in mathematics 1937–38. Having become interested in abstract algebra when Nathan Jacobson was at Bryn Mawr her first year and finding no one on the faculty in that area at Bryn Mawr, she wrote her dissertation in algebraic number theory under the direction of H. W. Brinkmann of nearby Swarthmore College.

Greenebaum's first position was as a research statistician with the International Statistical Bureau in New York City, where she worked from June 1938 until June 1939 doing economic statistical research for $25 a week. On June 25, 1939, she married Jess Epstein, a research engineer who worked for RCA Manufacturing Company in New Jersey. Epstein, born in Cincinnati, Ohio, in 1907, received a bachelor's degree in 1932 and a master's degree in 1934 from the University of Cincinnati after working as a co-op engineer for the Crosley Radio Corporation in Ohio 1926–31. He was an instructor of physics at the Cincinnati College of Pharmacy for one year before moving to his position with RCA in New Jersey in 1935. Jess Epstein remained with the RCA Manufacturing Company as research engineer until 1942, when RCA Laboratories opened in Princeton, New Jersey. He then worked at RCA Laboratories as research engineer 1942–62, as technical administrator of the Missile and Surface Radar Division 1962–67, and as staff engineer from 1967 until his retirement in 1973.

In May 1940 Marion Epstein wrote to Helen Owens that "unfortunately circumstances have kept me out of the academic field and I have turned my activities more toward the field of statistics and economic research" (Owens Papers). In her 1940 questionnaire she reported that she was engaged in some volunteer social service

work and some independent research. The first of the Epsteins' three children, Peter, was born on May 24, 1941, in Moorestown, New Jersey. Their two daughters, Barbara and Judith, were born in Princeton on December 16, 1943, and on January 7, 1948, respectively. All of the children earned master's degrees, married, and are or have been working in urban planning, education-related jobs, and therapy and counseling.

In 1944 Marion G. Epstein returned to work part time with the Educational Testing Service (ETS) in Princeton, New Jersey, where she remained, with some breaks, for the rest of her career. She worked in the Test Development Division until 1973. From 1944 to 1948, when her first two children were young, she worked as an associate examiner in mathematics about three hours a day, mainly on actuarial exams. When her youngest daughter was born in 1948, she stopped working at ETS for a time. In 1954, when her daughter entered school, she resumed part-time work as a professional associate in mathematics. In 1962 she began full-time work as senior examiner in mathematics. In this position she was responsible for graduate record exams, advanced placement exams, upper level college board tests, the original development of CLEP general mathematics examinations, development of computer assisted assembly of tests, and was project director for actuarial examinations. She became assistant director of the division in 1967 and associate director in 1968. She noted in 1981 that during her years with mathematics test development she worked closely with many mathematicians; she cited, in particular, A. W. Tucker and Samuel Wilkes of Princeton University and E. P. Vance of Oberlin College as having had special influence on her.

In 1973 Epstein moved to the College Board Programs Division of ETS, where she continued her administrative work. She was director of development and analysis 1973–75, administrative director of professional services (test development, publications, statistical analysis, and systems) 1975–77, and vice president 1977–80. After July 1980 she was senior advisor to the senior vice president for programs.

In connection with her work in educational testing, Epstein was engaged in curriculum writing for the School Mathematics Study Group (SMSG) during the summers of 1959 and 1960. She also served as consultant for test development workshops with teachers of mathematics for the West African Examinations Council in Ghana and Nigeria in the spring of 1964 and for the University of London School Examinations Department in the spring of 1967. Other consulting work included working with the NSF Institute for Teachers of Advanced Placement at Michigan State University.

Epstein was active and influential in a number of positions related to education. She was a member of the Princeton Township Board of Education 1955–66; she was vice president 1958–61 and president 1961–63. She was on the New Jersey State Board of Education 1966–77, as vice president 1975–77, chair of the legal committee 1975–77, and chair of the affirmative action committee 1974–77. In 1971–73 Epstein was co-chairperson of the Joint Committee on Postsecondary Vocational Education for the New Jersey State Board of Education and the Board of Higher Education. She was a member of the New Jersey Board of Higher Education 1973–77. In 1978 she became a member of the New Jersey Panel, American Council of Education National Identification Program for Women in Higher Education Administration, and in 1980 she became a trustee of Kean College of New Jersey (now Kean University) and was appointed to the advisory council to the Princeton University

mathematics department. She was also a member of the American Association for Higher Education and the American Personnel and Guidance Association.

In the 1950s, Epstein was active in the League of Women Voters, where she served the Princeton chapter as vice president 1950–54 and president 1954–56. She has also been a trustee of the Princeton Jewish Center and in 1979 became a member of the National Education Committee of the American Jewish Committee. She was elected secretary of Community Without Walls, a nonprofit association of Princeton-area residents supporting senior citizens, when its first governing body was elected in 1995.

Jess Epstein died on December 30, 1998. Marion Epstein continued to live in the Princeton area and had hospice care for about a year and a half before her death in her home in Skillman, N.J., on March 24, 2014, at age ninety-eight. She was survived by her three children, seven grandchildren, and three great-grandchildren. Marion Greenebaum Epstein was buried in Princeton Cemetery.

Organizational affiliations: AMS, MAA, NCTM, Phi Beta Kappa.

Dissertation:

1938 [Greenebaum, M.] The non-existence of integral normal bases in certain algebraic fields. PhD dissertation, Bryn Mawr College, directed by Heinrich Wilhelm Brinkmann (Swarthmore College).

Publications:

1939 [Greenebaum, M.] The wool top futures market. *The Daily News Record* (May).
1958 with S. S. Myers. How a mathematics test is born. *Math. Teacher* 51:299–302.
1963a Educational testing programs: what they can and cannot do. *Proc. 1963 Annual Meeting Natl. School Boards Assoc.*
1963b with S. S. Myers. Mathematical reform and the College Board mathematics examinations. *Amer. Math. Monthly* 70:665–67.
1966 Curricular change and the College Board mathematics examinations. *Tennessee Math. Bull.* (April).
1967 Computer assembly of tests. *Proc. 9th Annual Conf. Military Testing Assoc.* 49–56. Presented Toronto, ON, 27 Sept 1967.
1968 Testing in mathematics: Why? What? How? *Arith. Teacher* 15:311–19.
1973a Computer assisted assembly of tests at Educational Testing Service. *Educ. Tech.* 13 (3): 23–24. Invited article.
1973b Standardized mathematics tests *can* measure the right things. *Math. Teacher* 66:294,363–66. Invited forum article.

Technical reports:

1971 with others. Selection of products for focused dissemination. Educational Testing Service. PR-71-8 for the National Center for Educational Communication.
1974 Classification scheme for items in CAAT [computer assisted assembly of tests]. Educational Testing Service. Presented at the Computer Assisted Test Conference, San Diego, CA, 14–16 Oct 1974.

Presentations not listed above:

CEEB examinations: new directions. Presented to the NCTM, New York City, 14 Apr 1966.
Advanced placement program in mathematics – present and future. Presented by invitation to the MAA, Toms River, NJ, 6 May 1967.
Computer assisted assembly of tests from an item bank. Speech presented to the Amer. Psych. Assoc., San Francisco, CA, Aug 1968.
Tailoring a mathematics test to measure. Presented to the NCTM, Corpus Christi, TX, 18 Oct 1968.

A report from ETS on mathematical testing. Presented to the NCTM, Boston, MA, 12 Nov 1971.
Testing in mathematics: Why? What? How? Presented to the NCTM, Atlanta, GA, 26 Oct 1973.
"Thorough and efficient" education in New Jersey. Keynote address to the New Jersey Assoc. College Admissions Officers, Pomona, NJ, Jun 1977.
The SAT: How it is developed and what it tests. Presented to meeting of the Pennsylvania Assoc. College Admissions Counselors, Champion, PA, 26–27 Jun 1977.
On further examination: the SAT score decline panel report and implications for curriculum. Keynote speech to the Bergen County Superintendents Assoc., Mahwah, NJ, 16 Nov 1977.
The SAT: What it is and what it tells us. Presented to meeting of the Natl. Assoc. Secondary School Principals, Houston, TX, 2–6 Feb 1979.
Truth-in-testing legislation and its effects on admissions and advising. Presented to the Natl. Assoc. Academic Administrators, Ewing, NJ, 25 Oct 1979.

References to: LEduc 5, WhoAmW 6–7, WhoE 14–15.
The Greenebaum/Epstein Family; "Marion Greenebaum Epstein – Obituary – March 24, 2014", blog entry March 30, 2014.
The Greenebaum/Epstein Family; "Eulogy for Marion Greenebaum Epstein – by Peter Epstein – March 26, 2014", blog entry March 30, 2014.

Other sources: Owens questionnaire 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; Owens Papers; Bryn Mawr College Archives; US Census 1910, 1920, 1930 NY.

Last modified: January 9, 2016.

FARNUM, Fay. August 24, 1888–March 11, 1977.
Iowa State College of Agriculture and Mechanic Arts (BS 1909), Cornell University (MA 1915, PhD 1926).

Eugenia Fae Farnum, born in Spencer, Iowa, was the second of four children of Josephine (Jacobs), born in 1857 in New York State, and George Edwin Farnum, born in 1851 in New Hampshire. Her parents married in about 1875, and her father was a farmer in northwestern Iowa at the time of the 1900 census. Her siblings were an older brother, Roswell (1886–1917), and younger sisters, Anna (b. 1892) and Martha B. (b. 1894). In 1920 the family was living in Ames, Iowa, where Fay was an instructor at Iowa State College, Anna did clerical work for the Treasury Department in Washington, D.C., and Martha was a college chemistry instructor. Subsequently, Martha Belle Farnum received an MA in biology in 1922 and a PhD in biochemistry in 1926 from the University of Chicago.

Farnum graduated with a degree in general science from Iowa State College of Agriculture and Mechanic Arts (now Iowa State University of Science and Technology) in 1909. Between 1909 and 1914 she taught in high schools in Lyons, LeMars, and Ames, Iowa. She attended Cornell University 1914–15 and received her master's degree in 1915 having written her thesis using the name Fae Farnum. By the late teens she used only the name Fay Farnum.

Farnum then returned to Iowa where she was an instructor at Iowa State 1915–24. She attended the University of Chicago during the summers of 1921 and 1922. She returned to study at Cornell during 1924–25 and registered only for thesis supervision with Virgil Snyder in 1925–26. During her final year, Farnum was an instructor and taught two classes per semester including solid geometry, advanced algebra, and calculus. She received her doctorate in 1926 with her major subject geometry, her first minor mathematical analysis, and her second minor physics.

Soon after receiving her doctorate, Farnum began a lengthy period of teaching at Washington Square College, New York University. She served as instructor 1926–28 and then as assistant professor. During her early years at NYU, Farnum often taught two graduate courses a semester, mainly geometry but sometimes algebra or calculus of variations. By the mid-1930s she was more likely to teach two undergraduate courses and one graduate course. One of her students at NYU was Gertrude Blanch, for whom Farnum served as a reference when Blanch applied to Cornell for graduate school. During 1939–40 Farnum took a leave of absence from NYU to study at the Physics and Mathematics Institute in Copenhagen. She reported to her father in Ames, Iowa, on the April 1940 Nazi invasion of Denmark and described her trip back to the United States via Berlin, Munich, the Brenner Pass, Milan, and Genoa, where she took the USS *Manhattan* to New York.

Farnum returned to NYU after her leave and taught for at least one more year, 1940–41; both the undergraduate and graduate bulletins list her as scheduled to teach 1941–42. In 1943 she returned to the faculty of Iowa State, primarily to help the mathematics department meet the extra teaching required by the naval and army students. She was an assistant professor from 1943 to 1949, when she retired, and taught again as assistant professor 1955–57.

Farnum was living at least part time in Tucson, Arizona, by about 1952. In 1957 she was appointed assistant professor at the University of Arizona and that year,

at age sixty-nine, rejoined the MAA, having let her membership lapse in the early 1940s. She died in Tucson at age eighty-eight and was survived by cousins. Her obituary reported that she was a member of the First Congregational Church and the AAUW and that she was buried in Tucson Memorial Park South Lawn.

Organizational affiliations: AMS, MAA (charter member), AAUW, Sigma Xi.

Thesis and dissertation:
1915 Cavalier perspective and orthogonal axonometry. MA thesis, Cornell University. Typescript.
1926 On triadic Cremona nets of plane curves. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1928, reprinted from *Amer. J. Math.* 50:357–70.

Publications:
1919 with J. R. Sage, Jr. *Algebra Review: Examples with a few Rules and Suggestions.* Ames, IA: The Torch Press.
1928 On triadic Cremona nets of plane curves. *Amer. J. Math.* 50:357–70. Published version of PhD dissertation. Reviews: *JFM* 54.0686.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 34, pt. 1: 4 (W. G. J. ten Pas). Presented to the AMS, Columbus, OH, 9 Sep 1926; abstract: *Bull. Amer. Math. Soc.* 32:598 #60.

References to:
"Ames Woman Describes Nazi Invasion of Denmark." *Ames Daily Tribune*, 1940.
"Letter from the War Territory by Miss Farnum." *Ames Daily Tribune*, 18 Apr 1940.
"Dr. Fay Farnum Today." *Ames Daily Tribune*, 11 Feb 1943.
"Perotti, Farnum Fill Math Posts." *Ames Daily Tribune*, 29 Sep 1943.
Farnum, Fay. (Death notice) *Arizona Daily Star*, 14 Mar 1977.
"Fay Farnum." (Obituary) *Ames Tribune*, 17 Mar 1977.

Other sources: Division of Rare and Manuscript Collections, Cornell University Library; New York University Archives; communications with Iowa State University Alumni Association, Iowa State University Archives, and Tucson-Pima Public Library; US Census 1900, 1920 IA, 1930 NY.

Last modified: July 19, 2009.

FITCH, Annie (MacKinnon). June 1, 1868–September 12, 1940.
University of Kansas (BS 1889, MS 1891), Cornell University (PhD 1894).

Annie Louise MacKinnon was born in Woodstock, Ontario, Canada, the daughter of Annie Louise (Gilbert) (1834–ca. 1919), and Malcolm MacKinnon (1838–ca. 1903), natives of Ontario. The family was living in Kansas by 1870, and according to census records from 1870 and 1880, there were at least five children. They were Gilbert J., age five in 1870 but not listed in the 1880 census; Annie; Malcolm, an infant in 1870 and ten in 1880; Frederick B., age eight in 1880; and D. Stanley, age one in 1880. In 1870 her father was a real estate agent, and in 1880 he was a hardware merchant. She lived in Concordia, Kansas, during her childhood and graduated from Concordia High School.

MacKinnon then enrolled at the University of Kansas in Lawrence and was one of the first two women in our study to graduate from a public university. The University of Kansas opened in 1866 with about fifty students, roughly half men and half women, although the first degree was not awarded until 1873. It appears that after her graduation in 1889, MacKinnon began her graduate work in mathematics at Kansas. According to Price's history of the Kansas mathematics department, she was the third graduate student in mathematics in the university's history. MacKinnon also taught in the high school in Lawrence 1890–92 and received her master's degree in 1891. In 1891–92, she continued her studies at the University of Kansas with Henry Byron Newson, a research mathematician who had been appointed to the faculty a year earlier.

MacKinnon enrolled at Cornell University in October 1892 and was Erastus Brooks fellow her last year there, 1893–94. It was noted that she had previously completed non-resident graduate work in modern geometry. She received her PhD from Cornell in 1894 with major subject theory of functions, first minor quantics and statics, and second minor mathematical physics.

Annie MacKinnon spent the next two years studying mathematics at Göttingen, as Association of Collegiate Alumnae European fellow in 1894–95 and as Women's Education Association of Boston European fellow in 1895–96. Also at Göttingen during this period were Mary Frances Winston, later to marry Henry Byron Newson; John H. Tanner, an assistant professor of mathematics from Cornell; and Edward Fitch, an assistant professor of Greek at Hamilton College whom MacKinnon later married.

After returning from Göttingen in 1896, MacKinnon was appointed the professor of mathematics at Wells College, a small college for women in Aurora, New York, that awarded its first degree in 1869. In addition to being the only mathematics instructor, teaching courses through differential equations, she was registrar in 1900–01. She remained at Wells until 1901, when on July 3, in Lakeside, Ohio, she married Edward Fitch (1864–1946). MacKinnon's replacement at Wells was Anna Lavinia Van Benschoten, who would subsequently earn her doctorate from Cornell.

Edward Fitch was born in Alton, New York, and received his BA in 1886 and his MA in 1889 in Greek from Hamilton College, a school for men in Clinton, New York. He went to Göttingen in 1893 and studied under the eminent classical philologist Ulrich von Wilamowitz-Moellendorff. Fitch received his PhD in 1896, Wilamowitz's only American doctoral student. Like MacKinnon, Fitch returned that year from Göttingen to New York State. He resumed his position teaching Greek at Hamilton

College, which was nearly a hundred miles from Wells College. Edward Fitch spent the rest of his career at Hamilton, where he was promoted to associate professor in 1899 and was named Edward North Professor of Greek in 1904. He was dean 1926–32 and spent the following year as a professor at the American School of Classical Studies at Athens. He retired in 1934 as professor and dean emeritus. They had no children.

Annie Fitch was a member of the League of Women Voters and was on the book committee of a nearby town library. In the late 1920s, she reported to the AAUW that "after [her] marriage [she] continued upon mathematical investigations started some years before" (Maltby, 16). She was a charter member of the MAA and maintained that membership until her death at age seventy-two. She died at her home in Clinton, New York, after a long illness, having written to Helen Owens in May 1940, a few months before her death: "It seems to me worthwhile that some women are intelligent about things mathematical even if their own accomplishments are not great" (Owens Papers).

Organizational affiliations: AMS, MAA (charter member), AAAS, Phi Beta Kappa, Sigma Xi.

Dissertation:

1894 [MacKinnon, A. L.] Concomitant binary forms in terms of the roots. PhD dissertation, Cornell University, directed by James Edward Oliver. Printed version, reprinted from *Ann. of Math.* 9 (1895): 95–157 and 12 (1898): 95–109.

Publications:

1894 [MacKinnon, A. L.] *Women in Göttingen University.* Assoc. Coll. Alumnae Publ. Ser. II 26.

1895 [MacKinnon, A. L.] Concomitant binary forms in terms of the roots. *Ann. of Math.* 9:95–157. Published version PhD dissertation. Reviews: *JFM* 26.0141.02 (F. Meyer); *Rev. semestr. publ. math.* 4, pt. 2: 10 (D. J. Korteweg). Reprint with 1898 supplement: [Washington, DC?]: [1898?].

1898 [MacKinnon, A. L.] Concomitant binary forms in terms of the roots. *Ann. of Math.* 12:95–109. Supplement to 1895 article, with tables. Reviews: *JFM* 29.0089.02 (F. Meyer); *Rev. semestr. publ. math.* 7, pt. 1: 15 (W. A. Wythoff).

References to: BioWMath.

"Mrs. Edward Fitch." (Obituary) *New York Times*, 13 Sept 1940.
"Mrs. Edward Fitch of College Hill Expires." *Clinton Courier*, 19 Sept 1940.
"Annie MacKinnon Fitch." *Hamilton Alumni Review* 6, no. 1 (Oct 1940): 50.

Other sources: Owens questionnaire 1937; Owens Papers; Williams Papers; Rare and Manuscript Collections, Cornell University Library; Universitätsarchiv Göttingen, Niedersächische Staats- und Universitätsbibliothek; Maltby, *History of the Fellowships*; Price, *History of the Department of Mathematics of the University of Kansas*; Whitman, "Women in the American Mathematical Society before 1900" part 2; Tobies, "Zum Beginn des mathematischen Frauenstudiums in Preussen"; Singer, *Adventures Abroad: North American Women at German-Speaking Universities*; William N. Calder III, "The correspondence of Ulrich von Wilamowitz-Moellendorff with Edward Fitch," *Harvard Studies in Classical Philology* 83 (1979): 369–96; US Census 1870, 1880, 1910 KS, 1900, 1920 NY, 1930 IL.

Last modified: March 6, 2009.

FOCKE, Anne (Bosworth). September 29, 1868–May 15, 1907.
Wellesley College (BS 1890), Georg-Augusts-Universität Göttingen (PhD 1900).

Anne Lucy Bosworth was born in Woonsocket, Rhode Island, the only surviving child of Ellen (Metcalf) (1843–1929) and Alfred Bosworth (b. ca. 1846), both from Rhode Island. It appears that her mother was widowed some time in the early 1870s. Mrs. Ellen Bosworth was working at the Harris Institute Library in Woonsocket in 1874; in 1880 she was described as a librarian, and she, her sister, and Anne were living with Anne's maternal grandmother in Woonsocket. In the early 1890s, Ellen Bosworth and her sister were living at the same address.

After attending public schools in Woonsocket, Anne Bosworth entered Wellesley College in 1886 and graduated in 1890, in the same class as Grace Andrews, Clara Latimer Bacon, and the mother of Dorothy Kohlmetz.

Bosworth spent the two years after her graduation from Wellesley as a high school teacher in Amesbury, Massachusetts, before moving, in 1892, to Rhode Island College of Agricultural and Mechanical Arts (now University of Rhode Island) in Kingston as professor of mathematics. It was in 1892 that the college first offered instruction at the postsecondary level. During the summer quarters of 1894, 1896, and 1897, she studied with E. H. Moore and Oskar Bolza at the University of Chicago.

In April 1898, Anne Bosworth was granted a year's leave from Rhode Island College for study in Göttingen. That summer she attended Felix Klein's lectures in Mechanik, along with Emilie Norton Martin and Virginia Ragsdale, both graduates of Bryn Mawr College, who had studied at Göttingen the previous winter as well. While at Göttingen, Bosworth also heard lectures by Arthur Schönflies, Issai Schur, and Woldemar Voigt. In the winter semester 1898–99, Bosworth attended David Hilbert's lectures on Euclidean geometry; it was from these that she derived the basis for her subsequent dissertation work. Her daughter recalled in 1978:

> According to my grandmother, [my mother] had no plan for a doctorate – just a year's study. . . .
>
> In the spring she was "summoned" to tea with her professor, & she dressed her best, gloves, hat & all. After a ceremonial tea, her professor asked her when she expected to take her doctoral examinations. She said she had not any such intention, had not even thought of a dissertation topic! The professor said, "But your dissertation is finished"(!). It appeared she had done a special exercise for him, and it was considered an entirely original approach & acceptable as a thesis. So instead of spending her summer travelling in Italy, Greece, etc. she remained at Göttingen & took her exams & and passed with honor.

Bosworth took her oral examination on July 31, 1899, just over a year after she had arrived in Germany, and, accompanied by her mother, returned to the United States in August 1899. According to Renate Tobies, Hilbert assessed Bosworth's dissertation as "eine tüchtige und selbständige Leistung von wissenschaftlichen Werte" [a sound and independent achievement of scientific value] (our translation) (p. 136). The PhD from Göttingen was awarded in 1900. She became a member of the AMS

at about that time. In 1901, G. B. Halsted referred to her dissertation in a supplementary report to his bibliography on non-Euclidean geometry that was first published in 1878. He wrote that her dissertation "is a beautiful piece of non-Euclidean geometry, and is, so far as I know, the first feminine contribution to our fascinating subject" (*Amer. Math. Monthly* 228, *Science* 715).

Bosworth then returned to Rhode Island College and remained for the next two years, living with her mother in Kingston. While in Göttingen, however, she had met Theodore Moses Focke, who studied mathematics and physics there 1896–98 and received his PhD in 1898. On August 7, 1901, they were married in Kingston, Rhode Island. Theodore Focke was born on January 3, 1871, in Massillon, Ohio, and was an 1892 graduate of the Case School of Applied Science (later Case Institute of Technology, now Case Western Reserve University) in Cleveland. After his studies abroad, he returned to Case Institute of Technology, where he was an instructor of mathematics and civil engineering at the time of his marriage.

Anne Bosworth Focke left her position in Rhode Island and moved to Cleveland. Her daughter reported in 1978: "After their marriage, Mother did not teach again, but worked with Father, grading papers, being a good faculty wife, & having three children, of whom I am the oldest." The children were: Helen Metcalf, born June 10, 1902; Theodore Brown, born September 16, 1904; and Alfred Bosworth, born September 30, 1906.

On May 15 1907, Anne Bosworth Focke died at age thirty-eight of pneumonia, when her children were not quite five, three, and one. She was buried in Massillon, Ohio, her husband's birthplace. In 1910 her mother and aunt were both living in the Focke household in Cleveland.

Theodore M. Focke became Kerr professor of mathematics and head of the department at Case School of Applied Science in 1908 and then served as dean of the faculty from 1918 until his retirement in 1944, when he was awarded an honorary doctorate by that institution. He died on March 1, 1949. After earning a BA in chemistry and an MA in geology from Western Reserve University, Helen Focke remained there and received a BS in library science; she spent most of her career on the faculty of the School of Library Science of Case Western Reserve. She died in October 1997. Theodore Brown Focke received a DSc from the University of Nancy in France and, after serving as an engineer and then as an executive for various companies, was the president and director of a tire sales company in Johnstown, Pennsylvania. Alfred Bosworth Focke received a PhD in physics from the California Institute of Technology and ended his career as professor and chairman of the physics department of Harvey Mudd College. Theodore Brown Focke and Alfred Bosworth Focke died within three days of each other in June 1986.

Organizational affiliation: AMS.

Dissertation:

1899 [Bosworth, A. L.] Begründung einer vom Parallelenaxiome unabhängigen Streckenrechnung. PhD dissertation, Georg-Augusts-Universität Göttingen, directed by David Hilbert. Printed version, 1900, Druck der Dieterich'schen Universitäts-Buchdruckerei (W. Fr. Kaestner), Göttingen. PhD granted 1900.

References to: AmMSc 1, BioWMath.

Other sources: PhD dissertation vita 1900; correspondence between Helen Focke and one of the authors 1978; Universitätsarchiv Göttingen, Niedersächsische Staats- und Universitätsbibliothek; communications with Cleveland Public Library, South Kingstown (RI)

Public Library, and University of Rhode Island Archives; George Bruce Halsted, "Supplementary report on non-Euclidean geometry," *Amer. Math. Monthly* 11 (1901): 216–30 and *Science* n.s., 14 (1901): 705–17; Tobies, "Mathematikerinnen und ihre Doktorväter"; NatCAB 42 (Focke, Theodore Moses); BiDrLUS 5 (Focke, Helen M.); WhAm 9 (Focke, Alfred Bosworth); WhAm 9 (Theodore Brown Focke); US Census 1860 RI, 1870 NY, 1880, 1900 RI, 1910, 1920, 1930 OH.

Last modified: December 10, 2008.

FOWLER, Sister Mary Charlotte. August 26, 1899–August 26, 1997.
Catholic University of America (Catholic Sisters College) (BA 1927), Catholic University of America (MA 1935, PhD 1938).

Josephine Fowler was born in Mechanicsville, Maryland, the eldest of eleven children of Charlotte (Burch) (1879–1975) and Thomas Henry Fowler (1854–1920), natives of Maryland. Her parents married in 1898; it was a second marriage for her father who had four children by his previous marriage. He was a merchant and later a farmer. Her siblings were Ann Elizabeth (1900–1991), Mary Rebecca (1903–1991), Charles Burch (1906–1991), Joseph Alfred (1908–1977), Charlotte Turner (1910–2002), Dorothy D. (1912–1986), Ernest deSales (1914–1915), Mary Walter (1916–2000), Mary Rita (1918–1918), and Mary Jane (b. 1920).

Josephine Fowler attended public school until 1916 and then attended St. Mary's Academy in Leonardtown, Maryland, 1916–18. Upon graduation she was awarded the gold medal for mathematics. On September 24, 1918, she entered the novitiate of the Congregation of the Sisters of Charity of Nazareth, in Nazareth, Kentucky, and took the religious name Sister Mary Charlotte Fowler.

Sister Mary Charlotte taught religion, mathematics, physics, English, and history primarily in high schools from 1920 to 1933. In the same period she was doing course work, including five summers at the University of Kentucky in Lexington, where she took courses in Latin, English, art, and education, as well as correspondence courses in trigonometry and American literature. She also studied one summer at Notre Dame University where she took courses in statistics and modern algebra. Her first teaching assignment was at St. Vincent's Academy in Union County, Kentucky, 1920–21. Others were in Henderson, Kentucky, 1921–23 and in Yazoo City, Mississippi, 1923–26.

Fowler was in residence as a student at Catholic Sisters College of the Catholic University of America 1926–27 and received her bachelor's degree in 1927. She then taught in a high school in Mt. Vernon, Ohio, 1930–32 and in summer school at Nazareth Junior College in Kentucky in the summers 1927–30.

Sister Mary Charlotte was an assistant instructor in mathematics at Nazareth College in Nazareth, Kentucky, 1932–33 after which she was on leave for study at Catholic University. She was in residence at Catholic from 1933 until 1937 and earned her master's degree in 1935. When she left Catholic in 1937 she began teaching mathematics and physics at the Nazareth College campus in Louisville, Kentucky. The next year, 1938, she received her PhD with minors in physics and education, having written a dissertation in algebraic geometry under the direction of Aubrey Landry.

Nazareth College in Louisville was established in 1920 as a branch of Nazareth Academy in Nazareth. When Sister Mary Charlotte began teaching at Nazareth College in Louisville, she joined Sister Charles Mary Morrison who had come in 1931 and who was at various times head of the department, registrar, and dean of the college. Sister Mary Charlotte Fowler was professor of mathematics and physics until her retirement from the college in 1969. She was chairman of the department from 1950 until she was appointed president of the college in 1961. She taught some after she became president until her administrative duties became too great.

When Sister Mary Charlotte Fowler became president of Nazareth College in Louisville in 1961, the two campuses at Louisville and Nazareth became two distinct

colleges. In 1963 the name of the college in Louisville was changed to Catherine Spalding College to distinguish it from the college in Nazareth. In 1969, when Sister Mary Charlotte's tenure as president ended, the college in Louisville merged with the one in Nazareth, became coeducational, and adopted the name Spalding College (now Spalding University).

Fowler is credited with many positive changes and innovations while president of the college. These included overseeing a period of growth of about fifty percent in the student population and conducting the first capital campaign in the college's history. Graduate programs were added, and science, library, and dormitory buildings were constructed. The Fowler Fellowships, which allowed anyone sixty-five or older to take classes tuition-free, were created as was the Center for Continuing Education for the non-traditional student.

Sister Mary Charlotte was active in the community and was inducted into the Honorable Order of the Kentucky Colonels in 1967. She was a member of the Kentucky Academy of Science. In 1992 she described her political affiliation as Democrat. Among hobbies she enjoyed were reading, crafts, photography, stamp collecting, collection of unusual recipes, and weaving, which continued well into her retirement. She also was a member of the American Association of Physics Teachers.

In the early 1970s, she was living in St. Vincent's Home, an orphanage for boys, in Roanoke, Virginia. At some point, after the orphanage disbanded in 1975, she was living at the Motherhouse in Nazareth, Kentucky. Sister Mary Charlotte died on her ninety-eighth birthday in the Nazareth Home in Louisville, Kentucky, in 1997. She was survived by three sisters and a half-sister, and she was buried in the Nazareth Motherhouse Cemetery.

Organizational affiliations: AMS, MAA, NCTM.

Thesis and dissertation:
1935 Certain of the metric properties of conic sections and their projective bases. MA thesis, Catholic University of America, directed by Aubrey Edward Landry. Typescript.
1937 The discriminant of the sextic of double point parameters of the plane rational quartic curve. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC, by J. H. Furst Co., Baltimore, MD. PhD granted 1938. Review: *JFM* 63.0616.02 (R. Weitzeböck).

Abstracts:
1939 The discriminant of the sextic of double point parameters of the plane rational quartic curve. *Amer. Math. Monthly* 46:467 #1. Presented to the MAA, Murray, KY, 29 Apr 1939.
1946 Color reproduction matrices. *Amer. Math. Monthly* 53:620–21 #2. Presented to the MAA, Louisville, KY, 27 Apr 1946.

References to: AmMSc 8, 9P–11P; AmMWSc 12P; WhoAmW 3–8; WhoSSW 13.
Hawpe, David. "President Credited for Spalding College Growth." *Louisville Times*, 1965.
Glamann, Philip. "Ex-Spalding President Sister Mary Fowler Dies." *Louisville Courier-Journal*, 27 Aug 1997.
French, Stephanie. "Mary Charlotte Fowler, SCN: August 26, 1889 – August 26, 1997." *Spalding University News*, Fall 1997.
"Sister Mary Charlotte Fowler Dies." *Record* (KY), 4 Sep 1997.

Other sources: Owens questionnaire 1937; authors' questionnaire 1992; Catholic University Archives; communications with Spalding University Public Relations and Spalding

University Archives; US Census 1900, 1910, 1920, 1930 MD, 1930 KY; SSDI.

Last modified: August 5, 2009.

FRINK, Aline (Huke). March 2, 1904–March 14, 2000.
Mount Holyoke College (BA 1924), University of Chicago (MA 1927, PhD 1930).

Aline Huke was born in Torrington, Connecticut, the elder of two daughters of Mary Evelyn (Feustel) (b. 1872), of Massachusetts, and Allen Johnson Huke (1883–1956), from Connecticut. It appears that her parents married in May 1903 and divorced after a few years. Her father had remarried by 1910 and was later in the building supply business.

Her mother, Mary Feustel Huke, had been a special student in languages at Mount Holyoke College 1893–95. This classification was open without examination to teachers who were over twenty and who had taught for at least a year. Aline Huke's sister, Barbara Allen Huke, was born in Massachusetts in 1905, earned a BS degree from Massachusetts Agricultural College (now University of Massachusetts at Amherst), and died in 1927 while a graduate student in microbiology at Yale. In 1920, Aline Huke, her mother, and her sister were living in South Hadley Falls, Massachusetts, with her maternal grandmother and her aunt. Her mother was a public school teacher there.

Huke received her elementary and secondary education in the public schools of South Hadley, Massachusetts, and attended the high school there 1916–20. She wrote in 1982 that she "first really liked mathematics when [she] studied plane geometry in high school" (Smithsonian questionnaire). At Mount Holyoke College she took thirteen courses in mathematics, eight in German, six in physics, and four in music. She earned sophomore honors and was elected to Phi Beta Kappa in her junior year. During the summer of 1923, she studied education at Columbia before completing her work at Mount Holyoke and graduating magna cum laude in 1924. After her graduation from Mount Holyoke, Huke taught physics and algebra at the high school in Cobleskill, New York, for two years. In the summer of 1926 she took courses in pedagogy at the New York College for Teachers in Albany (now SUNY at Albany).

Aline Huke began her graduate work at the University of Chicago in October 1926 and remained through August 1927, when she completed her work for a master's degree with a thesis in mathematical physics, directed by A. C. Lunn of the mathematics department. During the year 1927–28, she held a resident fellowship in mathematics at Bryn Mawr College, where she studied with D. V. Widder and Echo D. Pepper. Huke returned to Chicago in the fall quarter of 1928 and held a graduate service scholarship for four consecutive quarters. She left Chicago to take a position as instructor of mathematics at Mount Holyoke College for the year 1929–30. She completed her dissertation in the calculus of variations and received her PhD from Chicago in 1930.

In 1930 Aline Huke went to Pennsylvania State College (now Pennsylvania State University) as an instructor of mathematics. On June 3 of the following year she married Orrin Frink, Jr., who had joined the mathematics faculty at Penn State in 1928. Frink, born May 31, 1901, in Brooklyn, New York, had earned his BA in 1922, MA in 1923, and PhD in 1926, all from Columbia University. He was an instructor at Princeton 1925–26 and a National Research Council fellow at Chicago 1926–27 and at Princeton 1927–28. Except for short periods on leave, Orrin Frink

remained at Penn State for the rest of his career. He was assistant professor 1928–29, associate professor 1929–33, and professor 1933–69. He was at the Institute for Advanced Study in 1940–41 and later was head of the department at Penn State for just over a decade.

Aline Frink gave up her full-time position for several years after her marriage in 1931. Orrin III, the first of their four children, was born in 1932. The other children were: Peter Hill, born 1939; John Allen, born 1941; and Elizabeth, born 1945. Aline Frink published mathematics papers in 1937 and 1938 and taught as an instructor at Penn State part time 1936–37 and occasionally, some part time and some full time, through 1944. She reported in a letter to one of the authors in 1977 that it was because of the efforts of Helen B. Owens that she was able to continue to teach after her marriage; Owens's husband, F. O. Owens, was the chairman of the Penn State mathematics department. Aline Frink wrote that she had somewhat annoyed him "by becoming pregnant and giving up the position that he had gotten for me somewhat in opposition to the administration." She also noted that Helen Owens "was thwarted by discrimination against women and determined that the same attitudes should not be held toward women in the future."

All but one of the children graduated from Pennsylvania State University. Orrin Frink III graduated from Haverford College and earned a PhD in Slavic languages and literature from Harvard before pursuing a career as a professor of foreign languages and literature; his last position was at Iowa State University. Peter H. Frink received an MFA degree from Yale and became an architect in Philadelphia. John A. Frink, became a computer analyst in Wilmington, Delaware, after having graduated with a mathematics major. Elizabeth Frink received an MFA degree from the University of North Carolina at Greensboro and studied at the Slade School of Art in London. She lives in Kennebunkport, Maine.

In 1947 Aline Frink resumed her career as a full-time faculty member. She was assistant professor until 1952, associate professor until 1962, and professor until her retirement in 1969, after which she was professor emeritus. Orrin Frink was head of the department from 1949 until 1960. In 1977 Aline Frink wrote that "needless to say, I wasn't appointed a full professor during that time." While at Penn State, she directed several master's theses; she published her last research paper in 1960.

Orrin Frink was an assistant chief engineer at the Special Projects Laboratory at Wright Patterson Air Force Base 1944–45. He was a Fulbright lecturer in Dublin, Ireland, 1960–61 and 1965–66. During the latter visit, Aline Frink lectured for a month at University College, Dublin, after she was asked to fill in for the analysis lecturer who was ill.

Having long had an interest in languages, Aline Frink began to study Russian in the late 1940s. This, together with her mathematical expertise in the calculus of variations, resulted in the book translation listed as **1962** below. She began the study of Chinese shortly before her retirement.

After the Frinks retired in 1969, they moved to a house in Kennebunkport, Maine, that had been in Aline Huke Frink's family since 1747. Her obituary indicates that she was a lifelong summer resident there. Orrin Frink died on March 4, 1988. Aline Frink was a member of the Congregational church, was treasurer of the Olympian Club of Kennebunkport and was vice president of the Kennebunkport Historical Society. She had a strong interest in music, bird watching, and her grandchildren.

Aline H. Frink died at the Kennebunk Nursing Center in Kennebunk, Maine, in 2000. She was ninety-six. Her obituary notes that she "stayed independent and strong-willed, driving and living alone" until about a year before her death. She was survived by her four children and eight grandchildren. In 2006 John Frink gave Penn State $100,000 in his parents' memory to create the Orrin and Aline Frink Trustee Matching Scholarship in the mathematics department.

Organizational affiliations: AMS, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1927 [Huke, A.] Some relativity fields in n dimensions. MA thesis, University of Chicago, directed by Arthur Constant Lunn. Typescript.

1930 [Huke, A.] An historical and critical study of the fundamental lemma in the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Typescript. Private edition, distributed by the University of Chicago Libraries. See also **1931**.

Publications:

1931 [Huke, A.] An historical and critical study of the fundamental lemma in the calculus of variations. In *Contributions to the Calculus of Variations, 1930*, 131–89. Chicago: University of Chicago Press. Published version of PhD dissertation. Reviews of book: *Bull. Amer. Math. Soc.* 38:617–21 (A. Dresden); *JFM* 57.0590.02 (J. Radon); *Zbl* 003.40001 (L. M. Graves).

1937 Distance functions and the metrization problem. *Bull. Amer. Math. Soc.* 43:133–42. Reviews: *JFM* 63.0571.03 (K. Künneth); *Zbl* 016.08205 (G. Nöbeling). Presented as "General distance functions and the metrization problem" to the AMS, Cambridge, MA, 1 Sep 1936; abstract: *Bull. Amer. Math. Soc.* 42 (7, pt. 1): 491–92 #291.

1938 with O. Frink. Polygonal variations. *Bull. Amer. Math. Soc.* 44:539–47. Presented by A. Frink to the AMS, Charlottesville, VA, 15 Apr 1938; abstract: *Bull. Amer. Math. Soc.* 44:198 #142. Reviews: *JFM* 64.0504.01 (H. Boerner); *Zbl* 019.21902 (L. M. Graves).

1960 Special variations. *Tôhoku Math. J.* 2nd ser., 12:203–207. Review: *Zbl* 100.09801 (Th. Lepage).

1962 (Translator from the Russian) *The Calculus of Variations*, by N. I. Akhiezer. New York: Blaisdell Publishing Co. Reviews: *Amer. Math. Monthly* 71:224–25 (L. M. Graves); *MR* 25 #5414; *SIAM Review* 5:161–62 (W. Flemming).

1964a Review of *An Introduction to the Calculus of Variations*, by L. A. Pars. *Amer. Math. Monthly* 71:709.

1964b Review of *Variationsrechnung und ihre Anwendung in Physik und Technik*, by P. Funk. *Amer. Math. Monthly* 71:932–33.

References to: AmMSc 5–8, 9P–11P; AmMWSc 12P–13P; AmWom 1935–40; WhoAmW 4–6; WorWhoW 2.

"Only Problems, Solving Them: Husband, Wife Add Answers; Won't Discuss Mathematics." *State College and Bellefonte Centre* (*PA*) *Daily Times*, 19 Mar 1969.

"Aline H. Frink, Mathematician at Penn State." (Obituary) *Portland* (*ME*) *Press Herald*, 16 Mar 2000.

"Math Faculty Couple's Son Creates Trustee Matching Scholarship In Their Honor." Penn State, Eberly College of Science, Alumni Relations and Development. May 2006.

Other sources: MA thesis vita 1927; PhD dissertation vita 1930; Owens questionnaire 1937; letter from Aline H. Frink to author, 2 Jun 1977; Smithsonian questionnaire 1982; Mount Holyoke College Archives; "Orrin Frink, Mathematician, 86," (Obituary) *New York*

Times, 17 Mar 1988; US Census 1900 CT, 1910, 1920, 1930 NY, 1900, 1910, 1920, 1930 MA.

Last modified: January 15, 2016.

FRY, Cleota G. December 30, 1910–July 1, 2001.
Reed College (BA 1933), Purdue University (MS 1936, PhD 1939).

Cleota Gage Fry was born in Shoshone, Idaho, the eldest of four children of Coral (Gage) (1891–1959), born in Mitchell, South Dakota, and Holmes L. Fry (1878–1968), originally of Davenport, Iowa. Her parents were married on January 12, 1910. Her mother, with a grade school education, was a housewife; her father, who had completed high school, was a machinist. Her younger siblings were Gladys Viola (1912–1977), born in Dietrich, Idaho; Russell (1919–1944), born in Portland, Oregon, and killed in action in World War II, having completed one semester of college before entering the service; and Eathel Irene (1921–1993), also born in Portland. Both sisters were educated through high school and married.

Fry's early, secondary, and undergraduate schooling was in Portland, where she graduated from Roosevelt High School in 1929. She then attended Reed College, having borrowed money from a lawyer friend, and graduated, probably as a physics major, in 1933. Her undergraduate thesis in the Division of Mathematics and Natural Sciences was "Analysis of textile fibers and fabrics."

An undated letter from Fry to her Reed College physics professor, A. A. Knowlton, sent sometime in 1955 summarizes her activities after her graduation from Reed.

> Late in October [1933], I climbed aboard a U[nion] P[acific] train headed east and got off in Chicago. Vivian [Johnson, a Reed College friend] met me, and we took in the World's Fair. I came down to Lafayette, Indiana. Since I could live with Vivian I started sitting in on graduate courses in mathematics and physics. In February I secured a part time job helping Dr. R. B. Abbott on his research on violins. I registered for 10 hours of course work and thereby launched my graduate study. I continued helping on the research program to find out what makes a violin good. To earn a little more money, I also tutored.
>
> I wrote a master's thesis on atomic form factors under Dr. Nordheim. The M.S. degree was granted in February 1936. There being nothing else to do, I started to work on a Ph.D. I changed from physics to mathematics as a major in the fall of 1937 because my thesis problem fell through since most of the work was published [the] previous summer. (letter in author's possession courtesy of Ruby A. Pardue)

In 1939 Fry received her doctorate in mathematics with a minor in physics, having written a dissertation in analysis under the direction of H. K. Hughes. Her PhD was the second in mathematics given by Purdue, the first having been awarded in 1893.

Fry remained at Purdue for her entire career, teaching at various times both mathematics and physics. She was an assistant instructor of mathematics 1939–40 and an instructor of physics 1941–45. During the war years she taught elementary and intermediate physics and was in charge of the physics laboratory. She also organized intensive physics courses for high school students.

The rest of her career at Purdue she was in the mathematics department: as instructor 1945–47, assistant professor 1947–55, and associate professor 1955–77. Her

teaching consisted of mathematics courses from the freshman through the graduate level. In the late 1940s, she was appointed faculty advisor to the mathematics majors. In the period 1952–61 she was also assistant to the dean in the School of Science. Fry coauthored a college mathematics textbook in 1952. In the mid-1950s she taught in a summer program for high school teachers set up by the General Electric Company. She also helped with Purdue's sci-math assembly, where high school students contribute projects and short papers, and with Purdue's spring regional Science Fair. She served on university and departmental committees and was secretary to the faculty of the School of Science, Education, and Humanities for at least three years in the early 1950s. She also served on examining committees for master's degree candidates, and preliminary and final examinations for PhD candidates.

In Fry's 1955 letter to Knowlton she wrote, "Vivian has told you about our house which we built together and the trips we take every summer. We occasionally knock a golf ball around Purdue's two courses. The scores are astronomical. The rest of the time we get our exercise by yard work." She also wrote, "The academic life and work seems to agree with me. Anyway I like it." Vivian A. Johnson was a member of the physics department at Purdue; she retired in 1979 and died in 1985. Their trips included a seven-month trip around the world.

Fry's next-door neighbor described Fry as not even five feet tall, with curly hair and delicate features, a "raving beauty." She said Fry was sweet, happy, and laughed a lot.

Cleota Fry died at ninety in 2001 in the St. Elizabeth Medical Center in Lafayette, Indiana. She had had a heart attack a few days earlier and chose not to have open heart surgery. There is a Cleota Gage Fry scholarship, a need-based scholarship at Reed College, as the result of an annuity purchased by Fry.

Organizational affiliations: AMS, MAA, APS, Sigma Xi.

Dissertation:

1939 Asymptotic developments of certain integral functions. PhD dissertation, Purdue University, directed by Howard Kibble Hughes. Printed version, 1942, reprinted from *Duke Math. J.* 9:791–802.

Publications:

1942 with H. K. Hughes. Asymptotic developments of certain integral functions. *Duke Math. J.* 9:791–802. Published version of PhD dissertation. Review: *MR* 4,137e (I. M. Sheffer).

1952 with W. L. Ayres and H. F. S. Jonah. *General College Mathematics*. New York, Toronto, and London: McGraw-Hill Book Co. Review: *Amer. Math. Monthly* 60:486–87 (B. H. Gere). Second and third eds.: 1960 and 1970. New York: McGraw-Hill Book Co.

1954 Review of *Theory of Equations*, by C. C. MacDuffee. *Science* n.s., 119:730.

Abstracts:

1943 with H. K. Hughes. Asymptotic developments of certain integral functions. *Bull. Amer. Math. Soc.* 49:45 #33. Presented by title to cancelled meeting of the AMS, New York City, 27–28 Dec 1942.

1946 with H. K. Hughes. Asymptotic developments of types of generalized Bessel functions. *Bull. Amer. Math. Soc.* 52:818 #297. Presented by H. K. Hughes to the AMS, Ithaca, NY, 22 Aug 1946.

References to: AmMSc 7–8, 9P–11P; AmMWSc 12P–13P, 14–23.

"Cleota Gage Fry, Dec. 30, 1910–July 1, 2001." *Lafayette Leader*, 6 Jul 2001.

Other sources: PhD dissertation vita 1939; Smithsonian questionnaire 1982; communication with Ruby A. Pardue (friend and next-door neighbor) 2001; communication with West Lafayette Public Library; US Census 1920, 1930 OR; SSDI.

Last modified: March 25, 2009.

GALVIN, Sister Catharine Francis. November 24, 1885–December 2, 1955. Loyola University of Chicago (PhB 1924), University of Notre Dame (MS 1930), Catholic University of America (PhD 1938).

Joanna Galvin was born in Spalding, Nebraska, the daughter of Mary (Lawless) (b. 1856) and Eugene Galvin (b. 1857), Nebraska pioneers, each of whom had emigrated from Ireland several years before their marriage in about 1884. In 1900 the household consisted of her mother; her father, a farmer; her paternal grandmother; and the five surviving children of six born: Mary (b. 1884), Joanna, Thomas (b. 1887), Jeremiah (b. 1890), and John (b. 1894).

Joanna Galvin taught in public schools in Nebraska before becoming a member of the Dominican Sisters of St. Catharine of Siena in Kentucky. She entered the order on March 6, 1914, and was professed on August 4, 1915. All of Sister Catharine Francis Galvin's ministry was in academies and colleges sponsored by the Dominican Sisters. From August 1915 until June 1921 she was a teacher at Immaculate Conception Academy in Hastings, Nebraska. She taught at Holy Rosary Academy in Louisville, Kentucky, 1921–22 and at St. Agnes Academy and College in Memphis, Tennessee, 1922–24. During the summers 1918–21 she attended undergraduate courses at Loyola University in Chicago and, according to University of Notre Dame records, received a PhB degree from Loyola in 1924 when she was thirty-eight.

Sister Catharine Francis taught again at Immaculate Conception in Nebraska 1924–26 before returning to St. Agnes, where she remained until the fall of 1933. While at St. Agnes she was professor in the mathematics department and was, for two years, dean of the college. According to an obituary "she was quickly recognized as an excellent teacher, a capable counsellor, a just disciplinarian, and a person of strong character, and high ideals" ("Nun Who Taught 30 Years Dies").

Sister Catharine Francis Galvin continued her studies by taking mathematics classes at Notre Dame during the summer sessions 1926–28 and in 1930. She received a master's degree from Notre Dame in August 1930, graduating magna cum laude. In 1933 she entered the Catholic University of America for further graduate work. She was in residence at Catholic University 1933–35 and 1936–37. During 1935–36 she returned to Holy Rosary Academy in Louisville as a high school teacher. Although she returned to St. Agnes College in Memphis in 1937, she also was a registered student at Catholic 1937–38. She received her PhD in 1938 with minors in chemistry and physics. She remained on the faculty at St. Agnes College (renamed Siena College in 1939) except for a year, 1945–46, at Holy Rosary Academy. Over the years her teaching assignments included chemistry, physics, and statistics, as well as mathematics. Sister Catharine Francis was bursar at both the academy and the college in Memphis and served as superior of her community for many years.

Sister Catharine Francis Galvin died at St. Joseph Hospital in Memphis, Tennessee, after an illness of two weeks. After her death at age seventy in 1955, she was buried in the cemetery at the motherhouse of the Dominican Sisters of St. Catharine of Siena in Kentucky. She was survived by a sister and two brothers.

Thesis and dissertation:

1930 The nine-point circle and the hyperbola with foci at the orthocenter and circumcenter of the triangle. MS thesis, University of Notre Dame. Typescript.

1938 Two geometrical representations of the symmetric correspondence $C_{n,n}$, with their interrelations. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC, by J. H. Furst Co., Baltimore, MD. Review: *JFM* 64.0676.01 (O. H. Keller).

References to:
"Sister Catherine [*sic*], Siena Teacher Dies." Unidentified newspaper clipping, Memphis, TN.
"Nun Who Taught 30 Years Dies in Memphis Hospital." Unidentified newspaper clipping, Memphis, TN.

Other sources: Catholic University catalogs; communications with Office of Registration and Records of Loyola University Chicago, St. Catharine of Siena Archives, St. Michael's Church (Spalding, NE), and University of Notre Dame Archives; US Census 1900, 1910, 1920 NE, 1930 TN.

Last modified: July 19, 2009.

GARVIN, Sister Mary Cleophas. December 11, 1899–January 16, 1990.
Fordham University (BS 1927), Saint Louis University (MS 1931, PhD 1934).

Sister Mary Cleophas Garvin was born Linetta Anna Garvin in Vickery, Ohio, the daughter of Odelia Margaret (Wilhelm) (1873–1962) and Austin Edward Garvin (1868–1926), natives of Ohio. Her mother was a housewife; her father was a meat dealer in 1900, a salesman in a meat market in 1910, and a foreman in an auto factory, Willys-Overland Company, in Toledo, Ohio, in 1920. She had one older sister, Lucille (1898–1923), and four younger brothers: Paul J. (1901–1986), Austin E. (1902–1986), Norbert J. (1904–1979), and Cleophus (1910–1914).

Garvin attended grade school at St. Ann's and high school at Notre Dame Academy, both in Toledo. She graduated from high school in May 1917 and entered the Congregation of the Sisters of Notre Dame in Cleveland, Ohio, on July 2, 1917. Her investment was on January 2, 1918, her first vows on January 2, 1920, and her final vows on January 1, 1923, in Cleveland. Her religious name, Mary Cleophas, was chosen in memory of her brother who died at age four when she was eleven.

Garvin was an instructor in mathematics and physics, as well as religion, history, and Latin, at Notre Dame High School in Cleveland from 1919 to 1929. While teaching full time, she spent eight years in part-time study completing her undergraduate work in science, mathematics, and education. She had extension courses at Notre Dame College and John Carroll University in Cleveland and summer courses at St. Xavier College (now Xavier University) in Cincinnati, Catholic Sisters College of the Catholic University of America, University of Notre Dame, and Fordham University.

After receiving her bachelor's degree from Fordham in 1927, Sister Mary Cleophas taught for two more years at Notre Dame High School. She had courses in French and education at Fordham in the summer of 1928 and courses in education at Columbia University in the summer of 1929. In autumn 1929 she entered Saint Louis University for full-time graduate study. She spent the next five years there and earned a master's degree in 1931 and a PhD in 1934 with studies in mathematics, physics, and astronomy. Her doctoral dissertation in analysis was written under the direction of Francis Regan, who had earned his PhD from Michigan in 1932. She was Regan's first doctoral student and the second to receive a PhD in mathematics from Saint Louis University. The published version of her dissertation appeared in the *American Journal of Mathematics*, and her results were extended in 1938 and 1944 by Regan's next two students, Rev. William C. Doyle and Ella C. Marth, whose dissertations appeared in the *Annals of Mathematics* and the *Duke Mathematical Journal*, respectively.

Immediately after receiving her doctorate, Sister Mary Cleophas returned to the Cleveland area to serve as professor of mathematics and physics and head of the science department at Notre Dame College. This college, affiliated with the Sisters of Notre Dame and then primarily for women, awarded its first bachelor's degree in 1926. Garvin remained as department head until her retirement in about 1976. She taught until 1975, was chairman of the computer center 1975–76, and was associated with the computer center until 1977. She also served as superior at the college 1947–53 and 1958–60.

Sister Mary Cleophas continued to take or audit courses. These included courses in religion and physics at John Carroll University and courses in mathematics at

Oklahoma State University (NSF institute, summer 1959); the University of Kansas (summer 1960); and Bowdoin College (summers 1961, 1962). She audited other courses at the University of Oklahoma and at Seton Hall University.

Among her contributions at the college, besides what was described as her "unusual talent for teaching," were special classes for parents to learn the "new math" with their children ("Sister Mary Cleophas: An Educator," 1). She provided elementary and secondary teachers with information about curricular changes, and introduced computer science to teachers and college students. In connection with her interest in computer science, in the late 1960s and early 1970s Sister Mary Cleophas applied for and received several grants for desktop computers and for computer-related workshops and institutes, especially for teachers. She also gave talks at meetings of NCTM. During her last few years at Notre Dame College her activities were focused mainly on the computer center. The Garvin Computing Center at Notre Dame College is named after her.

In addition to her professional affiliations with national mathematics and physics associations, Garvin was also a member of the Central Association of Science and Mathematics Teachers. In 1975 she was made an emeritus member of the Ohio Council of Teachers of Mathematics; in 1976 she was presented with a life membership.

Garvin's main intellectual interest outside of mathematics was music. A 1981 article quoted her as saying, "Although mathematics was my first interest, music was a close second. Rarely did I miss an opportunity to attend a good musical program, especially of the Cleveland Orchestra" ("Keeping in Touch – Sister Mary Cleophas").

Excerpts from the obituary that appeared in the *Notre Dame College of Ohio Today* emphasize yet another aspect of her life.

> Sister Mary Cleophas was ever concerned for the needy and the poor. In the early years of the college, she served as financial aid advisor for needy students. . . .
>
> She was a charter promoter of the Servants of the Paraclete, gathering stipends, food, and clothing for needy priests who had left the active ministry . . . . On Sundays she visited the lonely in a nursing home . . . .
>
> As the time for retirement from the classroom drew near, her outreach to the needy increased as she organized the distribution of bread to the hungry, new and used clothing to the needy, bed linens to the poor, and vitamins to the malnourished. To assure the continuation of this work, she founded the Cleveland Co-Workers of Mother Teresa, a group of 35 men and women who are dedicated to helping the lonely, the unwanted, and the poor. (p. 1)

Sister Mary Cleophas received the Vincent P. Haas Memorial Award for "putting Gospel values in action" and the Mayor's Award for volunteerism in 1985.

After her retirement, Sister Mary Cleophas remained at the college as archivist before moving to the Provincial House in Chardon, Ohio, in 1985. She died of pneumonia in the Provincial House Health Care Center in 1990, shortly after a celebration of her ninetieth birthday. The Sr. Mary Cleophas Award for Excellence in Mathematics was established at Notre Dame College after her death.

Organizational affiliations: AMS, MAA, NCTM, Amer. Assoc. of Physics Teachers, AAAS.

Thesis and dissertation:
1931 A critical comparison of the Gaussian and Laplacian methods of computing orbits based on the computation of the preliminary elements of the planet Pluto. MS thesis, Saint Louis University.
1934 On the convergence of a generalized series and the relation of its coefficients to those of the corresponding power series. PhD dissertation, Saint Louis University, directed by Francis Regan. Typescript.

Publication:
1936 A generalized Lambert series. *Amer. J. Math.* 58 (1936): 507–13. Published version of PhD dissertation. Presented by title as "On the convergence of a generalized series and the relation of its coefficients to those of the corresponding power series" to the AMS, Berkeley, CA, 20 Jun 1934; abstract: *Bull. Amer. Math. Soc.* 40:388 #204. Reviews: *JFM* 62.0336.01 (K. Knopp); *Zbl* 014.30401 (J. D. Tamarkin).

Presentations not listed above:
The computer spectrum for the small college. Presented to the NCTM, Cleveland, OH, 13 Nov 1969.
With Sr. Teresemarie McCloskey. The use of the computer as a tool in teaching mathematics. Presented to the NCTM, Canton, OH, 21 Mar 1975.

References to:
"Keeping in Touch – Sister Mary Cleophas." *Notre Dame Today*, March, 1981.
"Sister Mary Cleophas, Teacher at Notre Dame." (Obituary) *Cleveland Plain Dealer*, 17 Jan 1990.
Reinhard, Sister Mary Marthe, S.N.D. with contributions from Sister Teresemarie McCloskey, S.N.D. "Sister Mary Cleophas Garvin: An Educator for More Than 50 Years." (Obituary) *Notre Dame College of Ohio Today*, Spring 1990: 1, 6.

Other sources: Owens questionnaire 1937; Religious Women in Mathematics Survey 1983; communications with Archives of the Sisters of Notre Dame, Chardon, OH, with Sister Jeanne Garvin, IHM, (niece), and with Paul J. Garvin Jr. (nephew); communications with Saint Louis University Archives and University of Notre Dame Archives; US Census 1900, 1910, 1920 OH.

Last modified: March 6, 2009.

GENTRY, Ruth. February 22, 1862–October 18, 1917.
University of Michigan (PhB 1890), Bryn Mawr College (PhD 1894).

Ruth Ellen Gentry was born in Stilesville, Indiana, the daughter of Lucretia (1830–1909), born in Indiana, and Jeremiah Gentry (1827–1906), from Kentucky. Her father was a farmer and stock trader, and later dry goods merchant, in Stilesville, southwest of Indianapolis. She had at least two older siblings: a brother, Oliver (1853–1878), and a sister, Sarah F. (b. ca 1855).

Ruth Gentry attended the public schools of Stilesville. According to the Gentry family genealogy, she began teaching school at age sixteen and later used her savings to pay her way through college. She graduated from the Indiana State Normal School in Terre Haute in 1880 and "spent the next ten years in preparatory and college teaching, and in study in the University of Michigan" (PhD dissertation "Life"). She was formally admitted to the University of Michigan in October 1885. In a history of women at Michigan, a fellow student is quoted as describing the atmosphere for women taking mathematics classes with engineering students: "Ruth Gentry and I were the only girls in a large class of engineers. We had front seats and left the room first. I never did see the faces of those young men in class" (Bordin, 19). Before completing her undergraduate work she taught for two years. In 1886–88, she was Preceptress and Teacher of Mathematics and Mathematical Sciences in Deland, Florida. The school was called DeLand Academy and College her first year, and college preparatory classes were the highest level taught. Her second year there the school was called Deland University, and three students were enrolled in the college department. It became John B. Stetson University a year later. Gentry graduated from the University of Michigan with the PhB degree in 1890.

That fall Ruth Gentry began her graduate studies at Bryn Mawr College and held the fellowship in mathematics 1890–91. She was awarded the European Fellowship of the Association of Collegiate Alumnae for the year 1891–92. She first went to Berlin, where she knew people. She described her situation in a June 1892 article as follows:

> In America, I had heard that a woman was occasionally permitted, as an exceptional favor, to become a a sort of supposed-to-be-invisible guest in lectures in some universities of Germany; *that in Berlin, however, all effort to secure such exceptional privilege would be utterly useless*.... I made inquiries of various prominent Professors of Mathematics elsewhere than in Berlin; result, a collection of letters now treasured as *souvenirs*, no show of hope for me except in Leipzig, where the work in Mathematics was not exactly suited to my purpose, and a state of mind well adapted to lead to suicide.
>
> Having nursed my despair till the University [of Berlin] had officially opened, I concluded to seek a long-desired interview with Prof. Fuchs and "view the prospect o'er" for myself. Prof. Fuchs did not politely "thank me for the honor, etc., while regretting to be unable to admit a woman to his lectures;" he did not assure me Mathematics was a difficult subject which women, for the most part, could not comprehend (as one Professor had written); he did not, as the Rector of one University did, advise me to apply to the Ministerium, and accompany his advice with the assurance that

> my request would not be granted; he did not make me feel that a woman possessed of an interest in Mathematics was a sort of natural curiosity, whose existence demanded explanation. He asked me in his quiet, restful way, what I had done in Mathematics and under whose instruction, talked a minute or two about Briot and Bouquet's *Fonctions Elliptiques*, and told me to ask the Rector of the University whether a way could not be found to favor my petition. (**1892**, 45–46)

With the backing of Professor Lazarus Immanuel Fuchs, Rector Förster approved her request as long as the lecturers did not object. A month later that approval was revoked when it was discovered that in 1884, despite approval of a similar request by the University Senate, "the *Ministerium* had strictly, specifically forbidden" such arrangements (**1892**, 46). Nonetheless, the Rector allowed her to continue attending the lectures of Fuchs and Dr. Ludwig Schlesinger until the end of the semester. She remained in Europe through the first semester of 1892–93 and attended lectures by Professors Émile Picard, Gaston Darboux, and Louis Raffy at the Sorbonne, before returning to the United States in February 1893.

James C. Albisetti claims that Gentry may have had more impact on the admission of women to German universities than any other American woman. Although she studied one semester at Berlin, Albisetti claims that she applied first to the University of Heidelberg and was turned down on October 20, 1891. Just nine days later, however, "influenced by her application and that of Marie Gernet from Karlsruhe, five members of the mathematics-sciences faculty proposed that women should be allowed to study at Heidelberg with any professors who would have them. The university senate rejected this idea but was overridden by Baden's Ministry of Education, which ... gave them permission to audit courses in the mathematics-sciences faculty" (Albisetti, 225).

Gentry again held the fellowship in mathematics at Bryn Mawr in 1892–93 and was a fellow by courtesy there in 1893–94. In February 1894 she was elected to membership in the New York Mathematical Society, which became the American Mathematical Society a few months later. Gentry passed her examinations for the PhD degree in June 1894. In 1895 she was made a member of the academic council at Bryn Mawr College. Her dissertation, which appeared in printed form in 1896, was written under the direction of Charlotte A. Scott, whom she acknowledged by noting that, "I find it hard adequately to express my indebtedness and my gratitude for the inspiration derived from her unfailing interest in my work." Gentry was Scott's first PhD student; however, because of the delay in the printing of her dissertation, she is often listed as sharing that honor with Isabel Maddison who received her degree in 1896.

Gentry began teaching at Vassar College in 1894. She was instructor 1894–1900 and associate professor 1900–02. In her earliest years there, she taught courses in solid and spherical geometry, plane trigonometry, determinants and theory of equations, curve tracing, analytic geometry of three dimensions, modern methods in analytic geometry, and analytic mechanics, among possibly others. In 1901–02 she played cornet in the Vassar symphony orchestra.

She left Vassar in 1902 and took a position as associate principal and head teacher of mathematics at Miss Gleim's School for Girls, a private school in Pittsburgh, where she remained until 1905. In December 1905, Gentry reported to the Michigan

alumni office that her address was Stilesville, and in December 1909 and October 1910, she reported an Indianapolis address. In 1910 she also gave her occupation as unsalaried nursing. A later note indicated that she was doing charity work in Stilesville. From 1911 to 1914, she travelled in the United States and Europe and arrived back in the United States from Europe in February 1914. In August 1916, she reported that she was living in Indianapolis.

A vita published in 1929 by the AAUW reports that "Dr. Gentry was increasingly ill from the time she left Vassar until her death" (Maltby, 13). Obituaries indicate that she came from the East three weeks before her death to enter the Methodist Hospital in Indianapolis, where she died at age fifty-five in October 1917. The death certificate gives the cause of death as "Acute Melancholia" with contributor "Mental Status following Operation for Cancer of Breast." Ruth Gentry was buried in the family plot in Stilesville.

Organizational affiliations: AMS, ACA, Phi Beta Kappa.

Dissertation:
1894 On the forms of plane quartic curves. PhD dissertation, Bryn Mawr College, directed by Charlotte Angas Scott. Printed, 1896, by Press of Robert Drummond, New York City. Review: *JFM* 27.0490.04 (O. Toeplitz); Summary: *Bull. sci. math.* 2nd ser., 21:231–32. Review of summary: *Rev. semestr. publ. math.* 6, pt. 1: 43 (G. Manndery).

Publication:
1892 A winter in Berlin. *The Lantern (Bryn Mawr)* (June): 45–49.

References to: BioWMath, MacTutor, NotMat, NotSci 2, NotTwCS 1S.
Obituary. *Indianapolis News*, 19 Oct 1917.
Obituary. Unidentified newspaper clipping.
Edington, Will E. "Biographical sketches of Indiana scientists IV." *Proc. Indiana Acad. Sci.* 77 (1967): 336–37.

Other sources: PhD dissertation life 1896; Williams Papers; AAUW fellows file; Bryn Mawr College Archives; Center for Research Libraries College Catalog Collection; Universitätsarchiv Göttingen, Niedersächische Staats- und Universitätsbibliothek; University of Michigan Alumni Records Office; Vassar College Archives; Stilesville (IN) Cemetery; communication with Stetson University Archives; Albisetti, *Schooling German Girls and Women*; Ruth Bordin, *Women at Michigan* (Ann Arbor: University of Michigan Press, 1999); Maltby, *History of the Fellowships*; Singer, *Adventures Abroad: North American Women at German-Speaking Universities*; Whitman, "Women in the American Mathematical Society before 1900," pt. 2; Richard Gentry, *The Gentry Family in America 1676 to 1909 (New York: The Grafton Press, 1909)*; US Census 1860, 1870, 1880, 1900 IN; Indiana death certificate.

Last modified: March 25, 2009.

GIBBENS, Gladys. January 21, 1893–September 24, 1983.
H. Sophie Newcomb College (BA 1914), Tulane University (MA 1916), University of Chicago (PhD 1920).

Gladys Elizabeth Corson Gibbens was born in New Orleans, Louisiana, the eldest of three children of Belle Frances (Arbour) (1866–1954) and William Joseph Gibbens (1864–1934). Her mother was born in Baton Rouge and attended a private academy before her marriage in 1891. Her father was also born in Louisiana, attended Louisiana State University, and became an engineer. His occupation was described variously as sugar engineer, sugar machinist, proprietor of mill supplies, and merchant of machinery. The other children in the family were (Elizabeth) Hathaway (1894–1971) and William Joseph Jr. (1896–1976).

Gladys E. C. Gibbens attended private kindergarten and public grade school and was a boarding student at Ursuline Academy, a private Roman Catholic school for girls in New Orleans. After graduating from Ursuline Academy in 1910, she entered H. Sophie Newcomb College, a degree-granting, coordinate college for women in Tulane University in New Orleans. She was a member of Kappa Alpha Theta social sorority.

Gibbens graduated in 1914, and from 1914 to 1917 she held a teaching fellowship in mathematics at Newcomb College while she was studying at Tulane University. She received her master's degree in 1916, one of five master's degrees granted by Tulane at that June commencement.

In 1917 Gibbens moved to Chicago, where she studied for nine quarters at the University of Chicago during the next three years. In 1917–18 she was on the program committee of the Junior Mathematical Club, and in February 1918 she spoke at the club meeting about the limaçon, the topic of her master's thesis. In 1918–20 she also held a fellowship in the mathematics department. Gibbens took courses with E. H. Moore, L. E. Dickson, G. A. Bliss, E. J. Wilczynski, and F. R. Moulton, and wrote her dissertation under the direction of Wilczynski.

After receiving her PhD from the University of Chicago in 1920, Gibbens took a position as instructor at the University of Minnesota. She remained there throughout her career: as instructor 1920–25, assistant professor 1925–47, associate professor 1947–58, and associate professor emeritus after her retirement in 1958. Her slightly younger colleague Elizabeth Carlson had a similar employment history there. The two also shared an office for many years.

Gibbens taught a variety of courses at Minnesota. They included elementary and advanced undergraduate courses in algebra, geometry, and analysis, and several dealing with the mathematics of finance. She was usually course chairman for at least one course every quarter; this included administering the final examinations. She was long associated with Raymond W. Brink, department chairman after 1940, in a course in the field of general education. She generally worked during a summer session each year, often teaching differential equations or an upper level geometry course. In the summers of 1935 and 1936, she and Elizabeth Carlson co-taught a reading course for seniors. She also taught in the War Training Program in the summers of 1943 and 1944 and served as acting chairman of the department for several weeks each summer from the mid-1940s until near the time of her retirement.

While at the University of Minnesota, Gibbens regularly attended meetings of the Minnesota Section of the MAA. At her first meeting in June 1921 she was

elected to the executive committee of the section. The following year she served as acting secretary and was elected to the executive committee two more times during the 1920s.

Gibbens returned to New Orleans after her retirement in 1958. In the late 1930s, she indicated that her hobbies were gardening and music and that her favorite recreations were golf and boating. In 1982 she wrote that she had worked as a volunteer teacher in a hospital for crippled children. Gibbens died at age ninety at Tulane Medical Center in New Orleans after a long illness. Interment was in Lafayette Cemetery No. 1 in New Orleans.

Organizational affiliations: AMS, MAA, AAAS, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1916 A study of the limaçon. MA thesis, Tulane University. Typescript.
1920 A comparison of different line-geometric representations for functions of a complex variable. PhD dissertation, University of Chicago, directed by Ernest Julius Wilczynski. Printed, 1922, by Collegiate Press, George Banta Publishing Company, Menasha, WI.

Publications:
1930 Some constructions for the classical problems of geometry. *Amer. Math. Monthly* 37:343–48. Review: *JFM* 56.0813.03 (H. Pietsch). Presented as "Some methods for the classical problems of geometry" to the MAA, Northfield, MN, 17 May 1930.
1944 Review of *Mathematics of Business and Finance*, by W. B. Dyess and R. O. Gilmore. *Accounting Rev.* 19:97.

Abstracts not listed above:
1921 A comparison of different line-geometric representations for functions of a complex variable. *Bull. Amer. Math. Soc.* 27:305–6 #27. Based on PhD dissertation. Presented by title to the AMS, Chicago, 30 Dec 1920.
1924 A study of the relations between the focal surfaces of two congruences obtained from certain functions of a complex variable. *Bull. Amer. Math. Soc.* 30:393 #5. Presented to a meeting of the AMS, Chicago, 18–19 Apr 1924.

References to: AmMSc 4–8, 9P–11P; AmWom 1935–40.
"Gibbens," (Death notice) *New Orleans Times-Picayune*, 27 Sep 1983.
"Gladys Corson Gibbens Funeral Held," *New Orleans Times-Picayune*, 27 Sep 1983.

Other sources: Master's thesis vita 1916; PhD dissertation vita 1922; Owens questionnaire 1940; Smithsonian questionnaire 1982; communication with Warren Loud, former colleague; Tulane University Archives; University of Minnesota mathematics department; US Census 1900, 1910, 1920, LA; SSDI.

Last modified: June 23, 2011.

GLASGOW, Josephine (Burns). July 22, 1887–January 22, 1969.
University of Illinois (BA 1909, MA 1911, PhD 1913).

Josephine Elizabeth Burns was born in Greenville, Illinois, the daughter of Ida Jane (Carey) (1856–1929) of Ohio and James Clinton Burns (1850–1930) of Pennsylvania. Her father graduated in 1875 from Monmouth College, had a master's degree, and was later a professor of history at the Western Illinois State Normal School (now Western Illinois University) at Macomb. Her parents, who were college classmates, were married in 1878, and there were four children in the family: Clinton (1880–1939); Deane, born March 1884; Josephine; and Ruth, born August 1890. Deane and Ruth received bachelor's degrees from Illinois in 1907 and 1911, respectively. Deane Burns became a chemical engineer, and Clinton Burns was a retired executive of Standard Oil Company in China at the time of his death.

Josephine Burns prepared in the Monmouth and Macomb high schools and attended Western Illinois State Normal School 1904–06, shortly after it was established at the turn of the century and before it granted degrees. As an undergraduate at the University of Illinois she was a member of the Illiola Literary Society for women and the education honor society Kappa Delta Pi. Burns graduated in 1909, having earned Final Honors.

Josephine Burns remained at Illinois as a graduate student and held a mathematics scholarship in 1910–11. After earning her master's degree in 1911, she held a fellowship in mathematics at the University of Wisconsin 1911–12 and at the University of Illinois 1912–13. She received her PhD from Illinois in 1913. Her work in group theory for her master's thesis and her doctoral dissertation at Illinois resulted in a historical paper in the *Monthly* and a paper in the *American Journal of Mathematics*. For several years after its publication, her paper in the *Monthly* was among those listed when the editors publicized the historical papers they had published. Her PhD dissertation was directed by G. A. Miller, and it is likely that Miller, who had come to Illinois in 1906, also directed her master's thesis. Her critical reading of the page proofs of Miller's contribution to Miller, Blichfeldt, and Dickson's 1916 *Theory and Applications of Finite Groups* was acknowledged in the preface of that book.

Burns remained at Illinois as instructor 1913–15, 1918–20, first semester 1924–25, and 1925–26. On June 15, 1916, in Macomb, she married Robert Douglass Glasgow. Glasgow, born in Tennessee, Illinois, on April 3, 1879, had earned a BA in 1908 and a PhD in 1913 in entomology at the University of Illinois. He also remained at Illinois after obtaining his doctorate: as instructor 1913–24 and as associate 1924–28. While a student he served as a first lieutenant and a captain in the University Regiment and later served as a brevet (temporary) captain in the Illinois National Guard.

While the Glasgows were still at Illinois, Josephine B. Glasgow and Mary Gertrude Haseman, who was instructor there 1920–28, prepared a mimeographed freshman mathematics text. This work is likely to have formed the basis for the paper they read in 1926 to the Illinois Section of the MAA.

In 1928 Robert D. Glasgow took a position as state entomologist for New York, so they moved to Albany where they remained. In this position he was involved with pest control and later was particularly active in the Mosquito Control Association. Also in 1928, Josephine Burns Glasgow served as national secretary of Sigma

Delta Epsilon and represented that society in the council of the AAAS. While in Albany, she was active in the AAUW and in 1932 represented the state AAUW when the state Women's Joint Legislative Forum was organized. She became secretary-treasurer of the state AAUW in 1940, vice president of the North Atlantic region in 1947, and was appointed to the national board of directors as vice president in 1952. In 1951 the Albany branch named a fellowship in her honor.

The Glasgows had no children. They were particularly knowledgeable about ferns and mushrooms, and in the summer of 1954 Josephine Glasgow led one day of a six-day field trip organized by the American Fern Society.

Robert Glasgow retired in 1949, having reached the mandatory retirement age of seventy. He then served as a consultant to a firm in the Philippines. He died in Albany on July 15, 1964.

Josephine B. Glasgow died in or near Albany, New York, at age eighty-one in January 1969. Memorial contributions were to be given to the AAUW scholarship fund.

Organizational affiliations: AMS, AAAS, Sigma Delta Epsilon, AAUW, Sigma Xi.

Thesis and dissertation:

1911 [Burns, J. E.] The foundation period in the history of group theory. MA thesis, University of Illinois. Typescript. See also **1913b**.

1913 [Burns, J. E.] The abstract definitions of the groups of degree 8. PhD dissertation, University of Illinois, 1913, directed by George Abram Miller. Printed version, 1915, reprinted from *Amer. J. Math.* 37:195–214.

Publications:

1913a [Burns, J. E.] Daniel P. Cook. *J. Illinois State Hist. Soc.* 6:425-44.

1913b [Burns, J. E.] The foundation period in the history of group theory. *Amer. Math. Monthly* 20:141–48. Published version of MA thesis. Reviews: *JFM* 44.0060.04 (E. Lampe); *Rev. semestr. publ. math.* 22, pt. 1: 4 (E. Kasner).

1915 [Burns, J. E.] The abstract definitions of groups of degree 8. *Amer. J. Math.* 37:195–214. Published version of PhD dissertation. Reviews: *JFM* 45.0251.01 (L. Bieberbach); *Rev. semestr. publ. math.* 24, pt. 2: 3 (Ph. E. B. Jourdain).

Abstracts not listed above:

1913 [Burns, J. E.] The abstract definitions of the groups of degree eight. *Bull. Amer. Math. Soc.* 20:62 #3. Presented by title to the AMS, Madison, WI, 13 Sep 1913.

1926 with M. G. Haseman. Freshman mathematics for students with one year of high school algebra. *Amer. Math. Monthly* 33:394 #8. Presented to a meeting of the MAA, Decatur, IL, 7–8 May 1926.

References to: BioWMath.

"Josephine Glasgow." (Death notice) *Albany (NY) Times-Union*, 25 Jan 1969.

Other sources: PhD dissertation vita 1913; communications with the University of Illinois Alumni Association and with Helen Pond Burns, widow of Josephine Burns Glasgow's nephew; "James C. Burns 1850–1930," *J. Illinois State Hist. Soc.* 24 (1931): 350-51; AmMSc 9B (Glasgow, Robert Douglass); "Entomologist to Retire," *New York Times*, 29 Aug 1949; "Ferns Afield," *New York Times*, 8 Aug 1954; EncAB-A 36 (Glasgow, Robert Douglass, Ph.D.); "Clinton Burns," (Obituary) *New York Times*, 4 Feb 1939; US Census 1900, 1910, 1920 IL, 1930 NY.

Last modified: July 19, 2009.

GOUGH, Sister Mary de Lellis. February 15, 1892–April 7, 1983.
Catholic University of America (Catholic Sisters College) (BA 1920, MA 1923), Catholic University of America (PhD 1931).

Margaret Gough was born in Kilmore, County Wexford, Ireland, the daughter of Ellen (Dunne) and Walter Gough. She attended convent schools in Wexford for her elementary and intermediate education. She arrived in Galveston, Texas, on a ship from Liverpool on September 9, 1909, as one of a group of at least thirty novices from Ireland. She immediately entered the Congregation of the Sisters of Charity of the Incarnate Word in San Antonio, Texas, and took the religious name Mary de Lellis. Her profession of vows was in 1911. She continued her studies at Incarnate Word College, at that time a women's college and now the coeducational University of the Incarnate Word, in San Antonio.

Early in her teaching career Sister Mary de Lellis taught in Catholic elementary schools in Texas and in Missouri. She first taught high school mathematics at St. Mary's Academy in Amarillo, Texas. She earned her bachelor's degree from Catholic University in Washington, D.C., in 1920. She then began her college teaching of mathematics at Incarnate Word College and remained there for more than twenty years except for years when she was doing graduate work in mathematics. She first taught there until the second semester of 1921–22, when she was a graduate student at the University of Oklahoma. She then returned to Catholic University in 1922–23 and received her master's degree in 1923 before returning to Incarnate Word College until 1928. She studied at the University of Texas in the summer of 1927.

Sister Mary de Lellis had a leave from Incarnate Word beginning in 1928 for further graduate study at Catholic University, where she was in residence until 1931. She was one of four women religious who received PhD's in mathematics from Catholic in 1931; the other three were Sister Leonarda Burke, Sister Charles Mary Morrison, and Sister Mary Felice Vaudreuil. All four wrote their dissertations in algebraic geometry under the direction of Aubrey E. Landry. After she received her PhD with minors in education and physics, Sister Mary de Lellis returned to Incarnate Word College to teach mathematics until 1943. In 1943–44 she was a mathematics teacher at Incarnate Word Academy in St. Louis, Missouri, before becoming ill and requiring hospitalization at St. Anthony's Hospital in Amarillo, Texas. At this point, she changed from college teaching to working in the finance office at St. Joseph's Hospital in Fort Worth, where she was the chief accountant and treasurer for the next twenty years.

In 1964 Sister Mary de Lellis moved to St. Joseph's Convent, a home for retired sisters in San Antonio. She remained until her death there at age ninety-one in 1983. She is buried in the Incarnate Word Convent cemetery.

Organizational affiliation: AMS.

Thesis and dissertation:

1923 The representability of a number by an indefinite binary quadratic form. MA thesis, submitted to the Catholic Sisters College of the Catholic University of America. Typescript.

1931 On the condition for the existence of triangles in-and-circumscribed to certain types of the rational quartic curve and having a common side. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for the Catholic University of America, Washington, DC. Review: *JFM* 57.0826.03 (F. Schaale).

Other sources: PhD dissertation vita 1931; Owens questionnaire 1937; application for social security number 1966; communications with Incarnate Word Generalate Archives, Sr. Margaret Patrice Slattery of the University of the Incarnate Word, and University of Oklahoma Office of the Senior Vice President and Provost; SSDI.

Last modified: December 10, 2008.

GRANT, Anna M. C. June 22, 1903–February 23, 1984.
Dalhousie University (BA 1925), Bryn Mawr College (PhD 1937).

Anna Margaret Catherine Grant was the youngest of five children of Jessie (Gordon) (1860–1933) and Angus MacGillivray Grant (1854–1935), both of Nova Scotia, Canada; she was born in Springville, Pictou County, Nova Scotia. Both parents had attended country school, and her father was a foreman in weaving mills in Nova Scotia and in Providence, Rhode Island. Her siblings were Isabel MacGillivray (1891–1961), Jennie Gordon (1896–1983), Alexander James (1898–1949), and Donald Gordon (1900–1940). Her two older sisters received bachelor's degrees from Dalhousie University. Isabel Grant graduated in 1911, with great distinction in mathematics, and became the first woman actuary in the department of finance with the Canadian federal government. Jennie Grant graduated in 1917 and became head accountant for a major firm in Canada. Her brother Alexander was an electrical engineer who had graduated from McGill University. Her brother Donald was in the Canadian army in World War I, served overseas immediately upon graduation from high school, and then had a business in Canada.

Anna M. C. Grant attended public schools in Nova Scotia and in New Brunswick, Canada, before entering Dalhousie University in Halifax, Nova Scotia. She graduated in 1925 with great distinction in mathematics, English, and philosophy. After her graduation she taught in private schools for several years. They included St. Hilda's School, Calgary, Alberta, 1926–27; Kemper Hall, Kenosha, Wisconsin, 1927–29; and Miss Fine's School, Princeton, New Jersey, 1929–31.

Grant was a part-time graduate student in mathematics and physics at Bryn Mawr College 1931–34. She was also a full-time teacher at Miss Wright's School in Bryn Mawr starting in 1932 and continuing through 1934–35. She then returned to Bryn Mawr College as a full-time graduate student; she was a graduate scholar in mathematics 1935–36 and a graduate fellow in mathematics 1936–37. She also participated in a cooperative plan for graduate study with Swarthmore College and the University of Pennsylvania. She had classes with Anna Pell Wheeler, G. A. Hedlund, Marguerite Lehr, William B. Huff, John R. Kline, W. W. Flexner, and N. A. Jacobson. She wrote her dissertation under the direction of Hedlund and received her PhD in 1937, the same year as Annita Tuller, Hedlund's other student at Bryn Mawr. Grant published her dissertation in 1939, and Hedlund referred extensively to it in the article that immediately followed it in the *Duke Mathematical Journal*; he also referred to Tuller's dissertation in that article. In a 1970 Bryn Mawr College survey, Grant expressed her appreciation for "the sustained interest and encouragement on the part of Dr. Wheeler" (Bryn Mawr College Alumnae Association). At some point, she also took, but not for credit, mathematics courses at the University of Chicago.

While at Bryn Mawr College, Anna Grant listed her home as Rockville Centre, Long Island, New York, and she returned there after receiving her doctorate. All of her postdoctoral positions were in the New York City area, most often on Long Island. It appears that her first position began in the spring of 1938, when she taught mathematics from March to June to grades nine through eleven at the Kent Place School in Summit, New Jersey. She was a mathematics teacher at The Brearley School in Manhattan 1939–42. From 1943 to 1945 she was a member of the technical staff for Bell Telephone Laboratories in New York, and from 1946 to 1949

she was a project engineer for Project Sparrow for Sperry Gyroscope Company in Lake Success, New York.

Grant returned to The Brearley School as mathematics teacher and head of the department during the years 1949–51 and 1953–55. It was also during this period that she took both undergraduate and graduate courses in electrical engineering at Brooklyn Polytechnic Institute (now Polytechnic Institute of New York University). A niece wrote in 1985 that she studied engineering "in order to compete with men in her field. She had felt discriminated against in industry because of her gender" (Smithsonian questionnaire).

Grant worked as an engineer after the mid-1950s. From 1956 to 1959 she was principal engineer with the Dynamics Department at Republic Aviation Corporation in Farmingdale, New York. From 1959 to 1961 she was senior engineer with Fairchild Stratos Corporation in Wyandanch, New York, and from 1962 to 1967 she was an engineer working in dynamic analysis for the Airborne Instruments Laboratory in Deer Park, New York. Her niece reported that when she retired Grant was a senior research engineer doing trouble-shooting on guided missiles.

In addition to her work, Grant was interested in all types of sewing, gardening, cooking, baking, and writing. She was also knowledgeable about eighteenth-century porcelains. In 1970 she indicated that she was a Democrat and a Protestant. She made her home in Medford, New Jersey, after her retirement. She died in Medford in 1984 at age seventy-nine.

Organizational affiliation: AMS.

Dissertation:

1937 Asymptotic transitivity on surfaces of variable negative curvature. PhD dissertation, Bryn Mawr College, directed by Gustav Arnold Hedlund. Printed version, 1939, reprinted from *Duke Math. J.* 5:207–29.

Publication:

1939 Surfaces of negative curvature and permanent regional transitivity. *Duke Math. J.* 5:207–29. Published version of PhD dissertation. Reviews: *JFM* 65.1412.02 (H. Pietsch); *Zbl* 021.23603 (E. Hopf).

Other sources: PhD dissertation vita 1939; Smithsonian questionnaire 1985 (prepared by a niece, Jessie F. Flouton); Bryn Mawr College Archives; communications with Bryn Mawr College Alumnae Association, The Brearley School, and Kent Place School; G. A. Hedlund, "The measure of geodesic types on surfaces of negative curvature," *Duke Math. J.* 5 (1939): 230–48.

Last modified: January 30, 2011.

GRAUSTEIN, Mary F. (Curtis). April 12, 1884–July 18, 1972.
Wellesley College (BA 1906), Radcliffe College (MA 1915, PhD 1917).

Mary Florence Curtis was born in Westminster, Massachusetts, the eldest of five children of Jennie Esther (Lucas) (1857–1945) and Frank Abbott Curtis (1857–1937), both of Massachusetts. Her parents married in 1883. She grew up on a land-grant farm of 1790 in Westminster, in north central Massachusetts. Her siblings were brothers, Wolfred Abbott (1885–1979), Herman Nelson (1888–1963), and Henry Lucas (1891–1930), and a sister, Esther Jane (1896–1956), who was a member of the Wellesley class of 1917. Her brother Herman graduated from Harvard in 1911.

Mary Curtis attended Fitchburg High School in Massachusetts 1899–1902 before entering Wellesley College in 1902. She was a Wellesley honors scholar 1904–05 and 1905–06 and received her bachelor's degree in 1906. The two years after her graduation she taught German, algebra, and geometry at Leominster High School, a short distance from her family's home in Westminster, while also traveling in Europe in summer 1907. The following two years, from September 1908 until March 1910, she taught German and natural science at Cushing Academy in Ashburnham, also near her family's home. She had spent the summer semester of 1909 at Cornell studying botany and pedagogy. For three semesters, from May 1910 until August 1911, she studied mathematics and natural science at the university in Leipzig, Germany.

Upon her return from Leipzig, she joined the Wellesley College faculty as an instructor of mathematics. She was instructor from September 1911 to June 1914. In the meantime, she had begun her graduate studies in mathematics at Radcliffe College in September 1913. At Radcliffe she held a Mary E. Horton fellowship from Wellesley 1914–15 and earned her master's degree in 1915 and her doctorate in 1917 with a dissertation in differential geometry. Charles L. Bouton, associate professor, and Julian L. Coolidge, assistant professor, signed as faculty reviewers, and it is likely that she worked most closely with Coolidge. Curtis spent the year 1917–18 at the College for Women, Western Reserve University, in Cleveland, Ohio, as instructor and acting head, replacing a faculty member who was on leave. She returned to Wellesley, where she was instructor 1918–20 and assistant professor 1920–21. She was in Leipzig in the summer of 1920. In a November 1920 letter extracted in the *Bulletin* of the AMS, the Italian geometer and historian of mathematics Gino Loria wrote to the American historian of mathematics D. E. Smith that "Mary F. Curtis had established [a] remarkable result, that every rectifiable skew parabola is a helix" (27 (1921): 201). The extract from Loria's letter referred to Curtis's 1918 paper "On the rectifiability of a twisted cubic" and motivated her 1921 paper "On skew parabolas."

On June 10, 1921, at age thirty-seven, Mary F. Curtis married William Caspar Graustein in Wellesley. Graustein, born on November 15, 1888, in Cambridge, Massachusetts, had earned both his BA in 1910 and his MA in 1911 from Harvard. He was a traveling fellow from Harvard and earned his PhD in mathematics from Bonn in 1913. He returned to Harvard in 1913 as instructor of mathematics, and it was at Harvard that Mary Curtis was one of his students. He was at Rice Institute in Houston from 1914 to 1918. In 1919, after serving with the Ordnance Department of the US Army, Graustein again joined the faculty at Harvard.

After her marriage, Mary C. Graustein took a leave of absence for two years before she returned to Wellesley in 1923 as assistant professor. She remained at Wellesley until 1929, with a leave of absence in her final year, 1928–29. From 1926 until 1941 Graustein and Rachel Blodgett Adams were both tutors at Radcliffe, although Graustein was in Europe with her husband during the years 1928–29 and 1937–38. Graustein's 1931 report to the Wellesley alumnae magazine gives an indication of her activities. She wrote that they were in Lugano for the winter of 1928–29, where her husband finished his textbook, *Introduction to Higher Geometry*. During the summer of 1930 she "helped with the proof reading of the book, corrected papers for a course in the Summer School, and copied the manuscript for the second half of a mathematical text (in German)." She also described her work at Radcliffe in the *Wellesley Magazine*: "My tutorial work at Radcliffe consists of eleven 'tutees.' I see each of them for an hour every other week. Three of them are Seniors; they and their theses on 'Infinite Series,' 'Curve Fitting' and 'The Number System of Algebra' do their bit to keep me busy. I enjoy the work and the girls" (Wellesley College Alumnae Office). Mary Graustein was a member of the AMS committee on arrangements for its meetings at the Harvard Tercentenary in 1936. The Grausteins had no children.

The Grausteins spent every other summer in the Dolomites until prevented by World War II. William C. Graustein was professor of mathematics and assistant dean at Harvard when he was killed in an automobile accident, at the age of fifty-two, on January 22, 1941. In 1945 his older brother Archibald established the William Caspar Graustein Memorial Fund, which endowed a named professorship at Harvard, and in 1993 Archibald's son, William C. Graustein, a geochemist, enlarged the fund by $50 million and extended its focus to include preschool programs and elementary and secondary schools in Connecticut.

Mary C. Graustein eventually resumed full-time teaching after her husband's death. She was at Hunter College as instructor in the summer session 1941 and then held both substitute and part-time positions at Connecticut College and Abbott Academy in October and November 1941 and at Hunter College the rest of 1941–42. She was assistant professor at Oberlin College 1942–44 but had a leave of absence 1943–44 to care for her mother who was ill. She began teaching at Tufts College (now University) as assistant professor in 1944. In 1949 she wrote for the Wellesley alumnae magazine that she had come to Tufts to teach the Navy navigation and calculus and that she stayed on to teach the veterans after the war. She indicated that she maintained an apartment in Cambridge and kept her family's farm in Westminster. She also reported in the *Wellesley Magazine*, "Last summer in the midst of much needed painting and repairing at the farm, and at the end of Summer School, I flew to Germany for a month–my first trip by air. I had waited all the previous summer for a Military permit to go to Göttingen to finish some of my husband's papers and had little hope of getting a permit. I could have gone to Frankfurt in 1947 for a year as Mathematical Consultant at our Army Center; I would have enjoyed it for the summer but not for the winter" (Wellesley College Alumnae Office).

Graustein was promoted to associate professor at Tufts in 1950 and remained there until her retirement in 1955. From 1946 until 1954, she was also faculty resident of Paige Hall, a dormitory associated with Jackson College, the women's

coordinate college that is now fully integrated into the university. After her retirement she lived at her family home in Westminster. She continued to travel and to go to Cambridge for the symphony concert series. She described herself in the early 1940s as a Congregationalist and a Republican.

Mary Curtis Graustein died at eighty-eight in Heywood Memorial Hospital in Gardner, Massachusetts, and was buried in Mount Auburn Cemetery in Cambridge. She was survived by her brother Wolfred.

Organizational affiliations: AMS, Phi Beta Kappa, Sigma Xi.

Theses and dissertation:

1916a [Curtis, M. F.] The functions of the elliptic cylinder. Minor thesis, Radcliffe College.

1916b [Curtis, M. F.] The gyroscope. Minor thesis, Radcliffe College.

1917 [Curtis, M. F.] Curves invariant under point transformations of special type. PhD dissertation, Radcliffe College. See also **1922**.

Publications:

1918a [Curtis, M. F.] The existence of the functions of the elliptic cylinder. *Ann. of Math.* 2nd ser., 20:23–34. Reviews: *JFM* 46.0586.01 (M. Plancherel) 46:586; *Rev. semestr. publ. math.* 27, pt. 2: 13 (W. A. Whythoff). Presented as "A proof of the existence of the functions of the elliptic cylinder" to the AMS, Cleveland, OH, 5 Sep 1917; abstract: *Bull. Amer. Math. Soc.* 24:71 #29.

1918b [Curtis, M. F.] On the rectifiability of a twisted cubic. *Bull. Amer. Math. Soc.* 25:87–88. Reviews: *JFM* 47.0678.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 27, pt. 2: 7 (D. J. Korteweg). Presented by title as "Note on the rectifiability of a space cubic" to the AMS, New York City, 27 Apr 1918; abstract: *Bull. Amer. Math. Soc.* 24:469 #9. Review of abstract: *JFM* 46.1014.02 (G. Szegö).

1920 [Curtis, M. F.] On the rectifiability of a twisted cubic. *Bull. Amer. Math. Soc.* 26:275–77. Reviews: *JFM* 47.0678.02 (W. Fr. Meyer); *Rev. semestr. publ. math.* 28, pt. 2: 5 (D. J. Korteweg). Presented as "Note on the rectifiability of a twisted cubic" to the AMS, New York City, 31 Dec 1919.

1921 [Curtis, M. F.] On skew parabolas. *Bull. Amer. Math. Soc.* 27:437–38. Reviews: *JFM* 48.0761.03 (L. Neder); *Rev. semestr. publ. math.* 30, pt. 1: 6 (D. J. Korteweg).

1922 [Curtis, M. F.] Curves invariant under point-transformations of special type. *Trans. Amer. Math. Soc.* 23:151–72. Published version of PhD dissertation. Reviews: *JFM* 48.0393.02 (G. Faber); *Rev. semestr. publ. math.* 31, pt. 2: 11 (P. Mulder). Presented to the AMS, Hanover, NH, 5 Sep 1918; abstract: *Bull. Amer. Math. Soc.* 25:57 #15.

References to: AmMSc 3–8, 9P.

Obituary. *Boston Globe*, 19 Jul 1972.

Other sources: Owens questionnaires 1937, 1940; application for social security account number 1950; Wellesley College Alumnae Office; communications with Harvard University Archives, Schlesinger Library (Radcliffe Institute), and Tufts University Archives; "Dr. Graustein Killed as Auto Hits Pillar," *New York Times*, 23 Jan 1941; Kathleen Teltsch, "Family Uses Legacy to Aid Connecticut Schoolchildren" *New York Times*, 8 Dec 1993; US Census 1900, 1910, 1920, 1930 MA.

Last modified: July 19, 2009.

GRAY, Alta (Odoms). October 1, 1910–December 30, 2001.
University of Cincinnati (BA 1931, MA 1932, PhD 1936).

Alta Harriet Odoms was born in Fredonia, Indiana, the third of four children of Ethel (Nelson) (ca. 1878–1962) and John Bert Odoms (b. ca. 1872). Both her parents were natives of Ohio. She had two older sisters, Berta (b. ca. 1904) and Lulu (1909–2005), and a younger brother, Howard (1918–1995). In 1910 her father was a farmer in Crawford County, Ohio; in the 1920s and 1930s he was a plasterer, and the family was living in Clermont county, east of Cincinnati, Ohio.

After Alta Odoms graduated from high school in Milford, Ohio, all of her college education was completed at the nearby University of Cincinnati. As an undergraduate she was a member of the University of Cincinnati mathematics club before receiving her BA in 1931; she served as treasurer while a graduate student in fall 1932. Immediately after her graduation, Odoms continued her graduate work at the University of Cincinnati and received her master's degree in 1932 and her PhD in 1936. Essential parts of her dissertation appeared in an article that she coauthored with H. L. Miller. Miller, a 1931 student of Odom's advisor C. N. Moore, was then on the faculty of the College of Engineering and Commerce at Cincinnati.

From 1935 through March 1937, Odoms was in New York working as an editorial assistant for the American Mathematical Society after Caroline Seely's resignation as clerk; she was succeeded by Mildred M. Sullivan. While in New York, she regularly attended meetings of the AMS there. She also auditioned for and was selected to sing with the New York City Oratorio Society. She resigned from the AMS job after two years and looked for a teaching position. She wrote to one of the authors in 1992 that Duke offered her part-time teaching in the Woman's College if she would work for the *Duke Mathematical Journal*, which had begun two years earlier in 1935. Apparently the teaching part of the job just lasted for a year, after which she worked as secretary for the journal.

On December 10, 1938, Alta Odoms married William Frederick Gray. Gray, born in Charleston, South Carolina, in about 1913, and Odoms met in Durham, North Carolina. Interested in a career in government and foreign service, William Gray entered the Fletcher School, the oldest exclusively graduate school of international affairs in the United States, in Medford, Massachusetts, in 1941. This move caused Alta Gray to resign from her position at the *Duke Mathematical Journal*, but she found work in 1941–42 as secretary of the radiation laboratory at MIT. She described herself as "useful as jack-of-all-trades" in the 1992 letter. The Grays had a son and two daughters.

The Grays went to Washington, D.C., in 1942, where William Gray worked for the Board of Economic Warfare. Alta Gray "spent the next ten years producing and enjoying three children," according to her 1992 letter. In 1952 William Gray joined the State Department Foreign Service and served in countries in Europe and Latin America. Between assignments and after Gray's retirement in 1964, they lived in the Washington, D.C., area.

Alta Gray was interested in politics, history, and nineteenth-century literature. She wrote in 1992, "I have had a wonderful life. . . . Forgive me for having packed away all those mathematics books long years ago."

William Gray died in Charlottesville, Virginia, in 1986. Alta Gray continued to live in Charlottesville and was a long-time resident there of Branchlands Retirement

Village. In December 2001, during a holiday visit to a daughter in the Richmond, Virginia, area, she became ill and died at age ninety-one at the Bon Secours Memorial Regional Medical Center in Mechanicsville, Virginia. Gray was survived by her three children, William F. Jr., Ellen, and Barbara; four grandchildren; and a sister. She was buried in the Gray family plot in Magnolia Cemetery, Charleston, South Carolina.

Organizational affiliations: AMS, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1932 [Odoms, A. H.] On the summability of triple Fourier's series. MA thesis, University of Cincinnati. Typescript.
1936 [Odoms, A. H.] On the summability of double Fourier series. PhD dissertation, University of Cincinnati, directed by Charles Napoleon Moore. See also **1936** in **Publications**.

Publications:
1936 [Odoms, A. H.] with H. L. Miller. On the summability of multiple Fourier series. *Tôhoku Math. J.* 42:155–75. Includes essential parts of PhD dissertation. Reviews: *JFM* 62.0293.02 (J. Marcinkiewicz); *Zbl* 014.15604 (F. Lösch). Presented by title by A. Odoms as "On the summability of triple Fourier series" to the AMS, Los Angeles, 31 Aug 1932; abstract: *Bull. Amer. Math. Soc.* 38 (9, pt. 1): 637 #209.
2004 *Growing up in Clermont County, 1913-1935: The Autobiographical Notes of Alta Odoms Gray*, ed. E. G. Hawkins. Manquin, VA: Uppingham House.

Abstracts not listed above:
1934 [Odoms, A.] On the Cesaro mean of double Fourier series. *Bull. Amer. Math. Soc.* 40:33 #18. Presented to a meeting of the AMS, Cincinnati, OH, 1–2 Dec 1933.
1936 [Odoms, A.] On the logarithmic mean of double Fourier series. *Bull. Amer. Math. Soc.* 42 (1, pt. 2): 31 #35. Presented to the AMS, St. Louis, MO, 2 Jan 1936.

References to: AmMSc 6–7.
"Gray, Alta Odoms." (Death notice) *Washington Post*, 1 Jan 2002.
"Gray, Alta Odoms." (Obituary) *Cincinnati Enquirer*, 1 Jan 2002.

Other sources: Owens questionnaires 1937, 1940; letter from Alta O. Gray to author, 28 Aug 1992; US Census 1900, 1910, 1920, 1930 OH; SSDI.

Last modified: January 15, 2016.

GRAY, Marion C. March 26, 1902–September 16, 1979.
University of Edinburgh (MA 1922), Bryn Mawr College (PhD 1926).

Marion Cameron Gray was born in Ayr, Scotland, the daughter of Marion (Cameron) and James Gray. She attended Ayr Grammar School (1907–13) and Ayr Academy (1913–19) before matriculating at the University of Edinburgh in 1919. At the time of her matriculation she indicated that she was a member of the United Free Church of Scotland.

In 1922 Gray received her master's degree, the first degree given in universities in Scotland at that time, with first class honors in mathematics and natural philosophy. She remained at Edinburgh another two years as a post-graduate student in mathematics. While at Edinburgh she studied with E. T. Whittaker, whom she credited with first arousing her interest in mathematics.

Gray came to the United States in 1924 to study at Bryn Mawr College. At Bryn Mawr she held a British graduate scholarship and a Carnegie research scholarship. While at Bryn Mawr, she studied with Anna Pell Wheeler, David V. Widder, Marguerite Lehr in mathematics and James Barnes in physics before receiving her PhD in 1926 having written a dissertation in analysis and with allied subject physics. In December 1925, Barnes had written a letter of recommendation to the president of the University of Saskatchewan indicating that Gray was hoping to remain in the United States or Canada.

After receiving her doctorate, Gray returned to Great Britain, where she was a university assistant in natural philosophy at the the University of Edinburgh for one year and an assistant in mathematics at the Imperial College of Science in London for three years.

In 1930 she returned to the United States and was hired as an assistant engineer in the development and research department of American Telephone and Telegraph Company. She published two papers relevant to her work in the journal *Physics*, later to become the *Journal of Applied Physics*. In about 1932 she discovered what has become known as the Gray graph while "looking for what we called completely symmetric networks" (Gray to Bouwer, July 10, 1969). Although she never published anything about this graph, Izak Z. Bouwer learned of her work on the graph and mentioned it in his 1968 paper "An edge but not vertex transitive cubic graph" (*Canad. Math. Bull.* 11:533–35). In June 1969, he wrote to Gray of his "appreciation of the fact that at a time when graph theory was almost nonexistent, you had already found this graph with its interesting properties." The graph is discussed in "Gray Graph" from Wolfram MathWorld by Eric W. Weisstein, and in "Gray Graph" from Wikipedia, The Free Encyclopedia.

In 1934 she joined the technical staff of Bell Telephone Laboratories where she worked for more than thirty years, first in New York City and then in Murray Hill, New Jersey. While there, Gray published several more articles and contributed to the field of mathematical physics in other ways as well. In addition to writing book reviews in journals, she aided other authors and was acknowledged for her helpful discussions and for her computations. She also wrote 258 reviews in the first fourteen volumes of *Mathematical Reviews*. In 1954 Gray served on an ad hoc committee formed when the National Science Foundation asked the National Bureau of Standards (now the National Institute of Standards and Technology) to prepare a handbook of mathematical tables. The outcome of that project was the

Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables published in 1964. For her entry in the twelfth edition of *American Men and Women of Science*, she indicated her research interests as wave propagation over the spherical earth, mathematical theory of antenna radiation, propagation of waves in loaded wave guides, and numerical analysis. One hundred forty of her reviews in *MR* were classified as "optics, electromagnetic theory, circuits," while another 52 were classified as "special functions."

In the 1930s, Gray lived in New York City and later in East Orange, New Jersey. She became a naturalized United States citizen in 1937. After her retirement in 1967, Gray returned to Edinburgh, where she died at age seventy-seven in 1979.

Organizational affiliations: AMS, MAA, Edinburgh Math. Soc., London Math. Soc., AAAS, IEEE.

Dissertation:

1926 A boundary value problem of ordinary self-adjoint differential equations with singularities. PhD dissertation, Bryn Mawr College, directed by Anna Pell Wheeler. Typescript with manuscript addenda. Printed version, 1928, reprinted from *Amer. J. Math.* 50:431–58.

Publications:

1924 The equation of telegraphy. *Proc. Edinb. Math. Soc.* 42:14–28. Presented to the Edinburgh Math. Soc., 2 Nov 1923.

1925a The equation of conduction of heat. *Proc. Roy. Soc. Edinb.* 45:230–44. Review: *JFM* 51.0367.01 (H. Freudenthal).

1925b Particular solutions of the equation of conduction of heat in one dimension. *Proc. Edinb. Math. Soc.* 43:50–63. Review: *JFM* 51.0366.01 (G. Doetsch). Presented to the Edinburgh Math. Soc., 16 Jan 1925.

1928 A boundary value problem of ordinary self-adjoint differential equations with singularities. *Amer. J. Math.* 50:431–58. Published version of PhD dissertation. Reviews: *JFM* 54.0473.01 (J. D. Tamarkin); *Rev. semestr. publ. math.* 34, pt. 1: 5 (W. G. J. ten Pas).

1931 Note on some self-reciprocal functions in the double Fourier transform. *J. London Math. Soc.* 6:247–50. Reviews: *JFM* 57.0483.01 (W. Rogosinski); *Zbl* 003.15701 (J. D. Tamarkin). Presented to the London Math. Soc., 14 May 1931.

1933 Mutual impedance of long grounded wires when the conductivity of the earth varies exponentially with depth. *Physics* 4:76–80. Reviews: *JFM* 59.1489.04 (W. Rinow); *Zbl* 006.28402 (M. J. O. Strutt). Presented by title to the AMS, Ames, IA, 25 Nov 1932; abstract: *Bull. Amer. Math. Soc.* 38:815 #282.

1934 Mutual impedance of grounded wires lying on the surface of the earth when the conductivity varies exponentially with depth. *Physics* 5:35–37. Reviews: *JFM* 60.1414.02 (H. Karl); *Zbl* 008.23501 (M. J. O. Strutt).

1936 Review of *Graphical Solutions*, by C. O. Mackey. *Amer. Math. Monthly* 43:635.

1938 Review of *The History of Mathematical Teaching in Scotland to the End of the Eighteenth Century*, by D. K. Wilson. *Scripta Math.* 5:52–53.

1939 Defraction and refraction of a horizontally polarized electromagnetic wave over a spherical earth. *Philos. Mag.* 7th ser., 27:421–36. Review: *Zbl* 021.17802 (H. Bateman).

1941 with C. R. Burrows. The effect of the earth's curvature on ground-wave propagation. *Proc. I.R.E.* 29:16–24.

1944 A modification of Hallen's solution of the antenna problem. *J. Appl. Phys.* 15:61–65. Review: *MR* 6,282e (A. Erdélyi).

1948 with S. A. Schelkunoff. The approximate solution of linear differential equations. *Bell Syst. Tech. J.* 27:350–64. Reviews: *MTAC* 3:306 (Extract from text); *MR* 9,537d (H. O. Hartley).

1953a Legendre functions of fractional order. *Q. Appl. Math.* 11:311–18. Reviews: *MTAC* 3:306 (A. Erdélyi); *MR* 15,122l (A. Erdélyi); *Zbl* 053.23602 (O. Volk).
1953b Review of *Electromagnetic Theory*, by O. Heaviside. *Scripta Math.* 19:158–60.
1961 Bessel functions of integral order and complex argument. *Comm. ACM* 4:169.

References to: AmMSc 5–8, 9–11P; AmMWSc 12P; MacTutor.

Other sources: PhD dissertation vita 1928; Owens questionnaire 1937; application for US social security account number 1936; correspondence between Gray and I. Z. Bouwer 1968–69; correspondence between author and I. Z. Bouwer 2006; Bryn Mawr College Archives; University of Edinburgh Special Collections; University of Saskatchewan Archives; communication with Bryn Mawr College Special Collections Librarian.

Last modified: July 19, 2009.

GREENFIELD, Bella (Manel). October 13, 1915–April 3, 2010.
Hunter College (BA 1935), Columbia University (MA 1936), New York University (PhD 1939).

Bella Manel was born in New York City, the only child of Tillie (1887–1971) and Jacob Manel (1882–1956). Both of her parents were born in Poland, and they were married there in 1911 before immigrating to the United States in 1914. In 1930 the family was living in the Bronx, and her father worked for a dress manufacturer.

Manel graduated from Morris High School in the Bronx in 1931 and was recognized as one of the twelve most distinguished in scholarship of the more than 400 graduates of the school. She entered Hunter College in the fall and was elected to Phi Beta Kappa during her junior year. While at Hunter most of Manel's work in mathematics was taken with Mina Rees, and the two remained friends over the years. At the Hunter College graduation ceremonies in June 1935, the Joseph A. Gillet scholarship of forty-five dollars for proficiency in mathematics was divided equally between Manel and another Hunter student. Manel graduated summa cum laude. Manel then studied at Columbia University and received her master's degree in 1936 with a thesis directed by Joseph Fels Ritt on Weyl's foundation for the theory of functions.

In the fall of 1936, two years after Richard Courant's arrival in the United States, Bella Manel began her studies at New York University and served as receptionist and secretary for Courant. Constance Reid, in her biography of Courant, quotes Manel as recalling, "After I gave my first report in the seminar, his attitude toward me changed completely. I was accepted then and asked to lunch with him and the other students" (p. 188). In the spring of 1937 Manel received a Blumenthal fellowship and was able to give up her secretarial position with Courant. She held the fellowship for two years and wrote her dissertation under the direction of Courant on an aspect of Plateau's problem, a problem with which he had been involved for a number of years. She received her PhD in 1939 with a physics minor.

On March 6, 1938, Bella Manel married Max Shiffman (1914–2000), a fellow student of Courant. Shiffman was born in New York City and earned a bachelor's degree and a master's degree from City College of New York before receiving his PhD from NYU in 1938. He then served as instructor in the evening session at City College 1938–39 and as instructor at City College until 1942. During this period Bella Shiffman published her dissertation and a related paper, both under the name Bella Manel. The related paper was coauthored with Courant and her husband. The Shiffman's first child, Bernard, was born in June 1942.

During World War II and for a period thereafter, Max Shiffman was a research mathematician mainly working for the Applied Mathematics Panel of the Office of Scientific Research and Development at New York University. The Shiffman's second child, David, was born in November 1945. In 1946 Max Shiffman was appointed associate professor at New York University. He was then hired as full professor at Stanford University in 1948. According to the 2003 obituary by Peter Lax, Max Shiffman suffered the first of two schizophrenic breakdowns in 1951, with a second occurring in 1956.

In 1954 Bella Shiffman joined the Ramo-Wooldridge Corporation (later TRW Inc.) in Hawthorne, California, south of Los Angeles. She described some of her responsibilities on the curriculum vitae prepared after her retirement. From 1954

to 1956 she "hired, trained and supervised a desk calculator section [that] performed all the space technology computations for the newly formed company before the digital computer was installed. [Her] group then acted as an adjunct to the computer center." From 1956 to 1958 she "worked with the designers of special purpose digital computers by doing the experimental programming during the design stages and by devising the machine language. [She] developed a method of programming the RW–30 airborne computer which did not have random access memory. [She] developed a testing technique for checking out the RW–300 computer as well as devising the machine language for this desk size digital computer." She and Max Shiffman were divorced in February 1957.

On June 8, 1958, Bella Manel Shiffman married Emanuel Kotkin. Kotkin, a widower, was born in 1897 in London, England, and immigrated to the United States in his late teens. He was the president of a manufacturing plant at the time of their marriage. According to his family, Emanuel Kotkin had no middle name but often used "E" as a middle initial for business purposes. He used the name Emanuel Ernest Kotkin on his World War I draft registration card.

From 1959 to 1965 Bella Kotkin worked for the Rand Corporation in Santa Monica, California, as mathematician on the professional staff and later as consultant. She worked closely with Richard Bellman, and together they, along with others, produced a number of papers and technical reports; the technical reports included both research papers and working papers, which were called research memoranda. Bella Kotkin "worked on applications of mathematics and computers to medicine, [which] involved simulating biological experiments by computer solutions of mathematical models of cancer chemotherapy and other biological systems" (Greenfield curriculum vitae). Her work continued to be cited into the 1990s.

After 1965 she "took time out from her professional career to spend time with [her] husband, who was recovering from serious surgery, and to spend time with [her] ailing mother. During this period [she] spent a few years doing volunteer work, sometimes full time, in the area of human relations. Finally, the terminal nature of [her] husband's cancer condition prompted [them] to move to northern California near Stanford" (Greenfield curriculum vitae). During the academic year 1980–81 she was professor of mathematics and acting chairman of the department at the College of Notre Dame in Belmont, north of Palo Alto.

Emanuel Kotkin died May 31, 1981, and Bella Kotkin returned to Los Angeles that year. During 1982–84 she taught part time in the mathematics department at the University of California, Los Angeles. On September 17, 1984, she married Moses A. Greenfield, a medical physicist whose wife had died two years earlier. He was professor emeritus in the Department of Radiological Sciences of the School of Medicine at UCLA. Moses Greenfield was born in 1915 in New York City, earned a bachelor's degree from the City College of New York, and earned a master's degree in 1937 and a PhD in 1941 from New York University. He served as director of the biomedical physics graduate program at UCLA from 1960 until his retirement in 1982 and again during 1992–95. After her own retirement, Bella Greenfield devoted herself to music as a classical pianist and to her family.

In 1995 Moses Greenfield established the Bella Manel Prize for outstanding graduate work by a woman or other member of an under-represented group at the Courant Institute at New York University. Bella and Moses Greenfield lived in Los

Angeles until 2007, when they moved to Baltimore, where her son Bernard Shiffman was professor of mathematics at Johns Hopkins University. In 2010 Bernard Shiffman informed the authors that Moses Greenfield had developed Alzheimer's disease several years earlier and that his mother had cared for her husband until July 2009, when it became too difficult for her. Bella Greenfield died on April 3, 2010, at age ninety-four and was buried in the Baltimore Hebrew Cemetery. She was survived by her husband, children, grandchildren, and great-grandchildren.

Organizational affiliation: Phi Beta Kappa.

Thesis and dissertation:

1936 [Manel, B.] An analysis of Weyl's foundation for the theory of functions. MA thesis, Columbia University, directed by Joseph Fels Ritt.

1939 [Manel, B.] Conformal mapping of multiply connected domains on the basis of Plateau's problem. PhD dissertation, New York University, directed by Richard Courant. Typescript. Printed version, 1942, reprinted from *Univ. Nac. Tucumán Revista A* 3 (1): 141–49.

Publications:

1940 [Manel, B.] with R. Courant and M. Shiffman. A general theorem on conformal mapping of multiply connected domains. *Proc. Nat. Acad. Sci. USA* 26:503–507. Reviews: *JFM* 66.0370.02; *MR* 2,84c (E. F. Beckenbach).

1942 [Manel, B.] The conformal mapping of multiply-connected domains on the basis of Plateau's problem. *Univ. Nac. Tucumán Revista A* 3 (1): 141–49. Published version of PhD dissertation. Reviews: *MR* 4,217a (E. F. Beckenbach); *Zbl* 61.15601 (J. Gorski).

1958 [Shiffman, B.] Minimum time programming on a drum computer. In *1958 Institute of Radio Engineers (IRE) National Convention Record.* Vol. 6, Part 4, 327-29. New York: Institute of Radio Engineers. Presented to the IRE, New York City, 27 Mar 1958. Abstract: *Proc. IRE* 46:653 #49.5.

1962a [Kotkin, B.] with R. E. Bellman. On the numerical solution of a differential-difference equation arising in analytic number theory. *Math. Comp.* 16:473–75. Reviews: *MR* 26 #5756 (Authors' summary); *Zbl* 106.10602 (R. Ansorge). Also appeared as RAND Research Memorandum RM-2891-PR, 1962. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-147. Originally issued November 1961, revised February 1962.

1962b [Kotkin, B.] with R. E. Bellman and R. E. Kalaba. On a new approach to the computational solution of partial differential equations. *Proc. Nat. Acad. Sci. USA* 48:1325–27. Reviews: *MR* 25 #2710 (M. Lees); *Zbl* 106.32003 (R. Nicolovius). Also appeared as RAND Research Memorandum RM-3133-PR, 1962. Abstract: *Sel. Publ. Rand Corp.* 2 #1295. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 313.

1963a [Kotkin, B.] Experiments with a mathematical model of drug distribution for cancer chemotherapy research. In *Proceedings of the San Diego Symposium for Biomedical Engineering*, 164–66. La Jolla, Calif.: San Diego Symposium for Biomedical Engineering. Presented at San Diego Symposium for Biomedical Engineering, April 1963.

1963b [Kotkin, B.] A mathematical model of drug distribution and the solution of differential-difference equations. In *Proceedings of the IFIP Congress 62* edited by Cicely M. Popplewell, 145–48. Amsterdam: North-Holland Publishing Co. Review: *Inform. Process. J.* 1 #2514. Presented to the International Federation for Information Processing (IFIP) Congress, Munich, Germany, Aug 1962. Also appeared as RAND Research Memorandum RM-2907-RC, 1962. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-148. Abstract also appears in *Sel. Publ. Rand Corp.* 1 #681.

1963c [Kotkin, B.] with R. E. Bellman and R. E. Kalaba. Polynomial approximation—A new computational technique in dynamic programming: Allocation processes. *Math. Comp.* 17:155–61. Reviews: *Inform. Process. J.* 2 #6296; *MR* 28 #3527 (M. L. Balinski); *Zbl* 123.37303 (S. Vajda). Also appeared as RAND Research Memorandum RM-3084-PR,

1962. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-156. Review: *Inform. Process. J.* 1 #3169.

1964a [Kotkin, B.] with R. E. Bellman, J. A. Jacquez, and R. E. Kalaba. A mathematical model of drug distribution in the body: Implications for cancer chemotherapy. In *IIIrd International Congress of Chemotherapy* edited by H. P. Kuemmerle and P. Preziosi, 2:1694–707. Stuttgart: Georg Thieme Verlag and New York: Hafner Publishing Co. Presented to the IIIrd International Congress of Chemotherapy, Stuttgart, Germany, 22–27 Jul 1963. Reprint 1986: In *The Bellman Continuum: A Collection of the Works of Richard E. Bellman* edited by Robert S. Roth, 447–60. Singapore: World Scientific. Also appeared as RAND Research Memorandum RM-3463-NIH, 1963. Abstract: *Sel. Publ. Rand Corp.* 1 #136. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 326.

1964b [Kotkin, B.] with R. E. Bellman and R. E. Kalaba. Differential approximation applied to the solution of convolution equations. *Math. Comp.* 18:487–91. Reviews: *Inform. Process. J.* 3 #9669. *MR* 29 #2977 (H. Oser); *Zbl* 131.14602 (J. Kuntzmann). Also appeared as RAND Research Memorandum RM-3601-NIH, 1963. Abstract: *Sel. Publ. Rand Corp.* 1 #104. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 332.

Technical reports:

1960a [Kotkin, B.] Numerical investigations of chemotherapy models. RAND Paper P-2044. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): P-236. Presented as "A mathematical model of drug distribution and digital computer experiments" to the 4th International Conference on Medical Electronics, New York City, 19 Jul 1961. Abstract: *Digest of the 1961 International Conference on Medical Electronics* edited by Peter L. Frommer, 142. Princeton, N.J.: The Conference Committee for the 1961 International Conference on Medical Electronics.

1960b [Kotkin, B.] with J. A. Jacquez. New version of a two-organ chemotherapy model. RAND Paper P-2154. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): P-253.

1961 [Kotkin, B.] with R. E. Bellman. On the computational solution of a class of nonlinear differential-difference equations. RAND Paper P-2233. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): P-264.

1962a [Kotkin, B.] with R. E. Bellman. On the approximation of curves by line segments using dynamic programming–II. RAND Research Memorandum RM-2978-PR. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-151.

1962b [Kotkin, B.] with R. E. Bellman and R. E. Kalaba. Some numerical results using quasilinearization for nonlinear two-point boundary value problems. RAND Research Memorandum RM-3113-PR. Abstract: *Index Sel. Publ. Rand Corp.* 1 (1946–1962): RM-157.

1963a [Kotkin, B.] with R. E. Bellman. A note on the computational solution of a system of differential equations with varying time-lags. RAND Research Memorandum RM-3835-NIH. Abstract: *Sel. Publ. Rand Corp.* 1 #521. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 342.

1963b [Kotkin, B.] with R. E. Bellman. A numerical approach to the convolution equations of a mathematical model of chemotherapy. RAND Research Memorandum RM-3716-NIH. Abstract: *Sel. Publ. Rand Corp.* 1 #235. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 336.

1963c [Kotkin, B.] with R. E. Bellman and M. M. Elkind. A mathematical model of radiation and population of cell colonies–I: Two-dimensional random-walk model. RAND Research Memorandum RM-3665-NIH. Abstract: *Sel. Publ. Rand Corp.* 1 #228. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 334. Review: *Inform. Process. J.* 2 #7058.

1964a [Kotkin, B.] with R. E. Bellman. Chemotherapy, convolutional equations, and differential approximation. RAND Paper P-3005. Abstract: *Sel. Publ. Rand Corp.* 2 #1727. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 516. Presented as

"Convolution equations and differential approximation" to the Second Annual Symposium on Biomathematics and Computer Sciences in the Life Sciences, Houston, TX, May 1964.
1964b [Kotkin, B.] with R. E. Bellman and R. E. Kalaba. Applications of a new approach to the computational solution of a system of two non-linear partial differential equations. RAND Research Memorandum RM-4240-PR. Abstract: *Sel. Publ. Rand Corp.* 2 #1461. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 359. Review: *Inform. Process. J.* 4 #12,851.
1964c [Kotkin, B.] with J. D. Buell, I. Cooper, and J. A. Jacquez. A three-organ drug distribution model including the kidney. RAND Research Memorandum RM-4175-NIH. Abstract: *Sel. Publ. Rand Corp.* 2 #1453. Abstract also appears in *Sel. Rand Abstr. Cumulative Ed., 1963–1972*, 356.

Abstracts not listed above:
1940 [Manel, B.] Conformal mapping of multiply connected domains on the basis of Plateau's problem. *Bull. Amer. Math. Soc.* 46:610 #384. Based on PhD dissertation. Presented by title to a meeting of the AMS, Hanover, NH, 10–12 Sep 1940.
1962 [Kotkin, B.] Digital computer experiments with a mathematical model of drug distribution. *Biometrics* 18:623 #847. Presented to a meeting of the Biometric Society, Minneapolis, MN, 7 Sep 1962.

Reference to: "Bella Manel Greenfield." (Death Notice) *Baltimore Sun*, 12 April 2010.

Other sources: Authors' questionnaire 1998; Dr. Bella Greenfield undated curriculum vitae sent to author 1998; private communication with Bella Greenfield 1998; private communication with son Bernard Shiffman 2010; Constance Reid, *Courant in Göttingen and New York* (New York: Springer-Verlag, 1976); Peter D. Lax, "Max Shiffman (1914–2000)," *Not. Amer. Math. Soc.* 50 (2003): 1401; US Census 1930 NY.

Last modified: June 23, 2011.

GRENNAN, Elizabeth (Bennett). October 9, 1880–October 15, 1972.
Ohio University (BS 1903), University of Illinois (MA 1908, PhD 1910).

Elizabeth Ruth Bennett, named Lizzie Ruth at birth, was the daughter of Pennsylvania natives Emmeline (Loux) (1852–1923) and Daniel Tinsman Bennett (1847–1921), who married in 1877. Bennett was born in Shawnee, in Monroe County, in east central Pennsylvania, the second of seven children. Her father was described as a miller in 1880 and 1900 and as proprietor of a livery stable in 1910. The other children in the family were Clara R. (1878–1961), Frank L. (1882–1897), Ida M. (b. 1884), Sarah E. (1886–1924), Lillian M. (b. 1888), and John Loux (1891–1957).

Elizabeth Bennett graduated from the State Normal School in nearby East Stroudsburg, Pennsylvania, in 1898. Her occupation is listed as teacher (unemployed four months) in 1900. She attended Ohio University in Athens where she received her BA in 1903. She held a scholarship in mathematics at the University of Illinois in 1907–08 and a fellowship 1908–10. She received a master's degree in 1908 and her PhD in 1910. Her dissertation in group theory was directed by G. A. Miller. Bennett's doctorate was the second granted by the department, and was the first to a woman.

In 1910 Bennett went to the University of Nebraska in Lincoln as an instructor. Elizabeth Bennett and John Grennan, a faculty member in mechanical engineering at Nebraska, married in Lincoln on June 12, 1913. John Grennan was born in Michigan in 1881. In 1910 he was living with his family in Ann Arbor, Michigan, where he was working as a moulder in a foundry. He attended a summer session at the University of Michigan in 1911, and that fall he was appointed instructor in forge and foundry work at the University of Nebraska. He continued to attend summer sessions at Michigan in 1912 and 1913 and at Nebraska in 1915.

The Grennans remained on the faculty at Nebraska until 1916, when John Grennan took a position as foreman of the forge shop at Michigan Agricultural College (now Michigan State University) in East Lansing. After two years they both moved to the University of Illinois. Elizabeth Grennan was appointed instructor of mathematics in September 1918, apparently on a term by term basis. John Grennan was first appointed for twelve months as instructor in foundry practice and management in the College of Engineering in July 1918 and was reappointed as assistant superintendent of the foundry in July 1919 and again in about March 1920. Both Grennans left Illinois in 1920, and John Grennan went to Camp Grant, an army training facility near Rockford, Illinois, as an instructor of foundry.

In 1922 John Grennan became an instructor of foundry practice in the metal processing department at the University of Michigan; in 1930 he revised a previously published "practical handbook of standard foundry practice" and retired in June 1947 as instructor emeritus of foundry practice.

Elizabeth and John Grennan had no children and remained in Ann Arbor after his retirement. In about 1940 Elizabeth Grennan reported that she was retired, her church affiliation was Unitarian, her hobby was gardening, and her favorite recreation was camping.

John Grennan died in November 1964, and a John Grennan scholarship for studies related to foundry practice or technology in the materials science and engineering department was established as the result of a $20,000 bequest to the University of Michigan by Elizabeth B. Grennan. Elizabeth B. Grennan died in Ann Arbor in

October 1972, shortly after her ninety-second birthday. She also made a bequest to the University of Illinois that funds an Elizabeth R. Bennett scholarship in mathematics.

Organizational affiliations: AMS, Sigma Xi.

Dissertation:
1910 [Bennett, E. R.] Primitive groups with a determination of the primitive groups of degree 20. PhD dissertation, University of Illinois, directed by George Abram Miller. Printed version, 1912, reprinted from *Amer. J. Math.* 34:1–20.

Publications:
1908 [Bennett, E. R.] Factoring in a domain of rationality. *Amer. Math. Monthly* 15:222–26.
1909 [Bennett, E. R.] Periodic decimal fractions. *Amer. Math. Monthly* 16:79–82.
1912 [Bennett, E. R.] Primitive groups with a determination of the primitive groups of degree 20. *Amer. J. Math.* 34:1–20. Published version of PhD dissertation. Review: *JFM* 43.0200.02 (L. Bieberbach). Presented as "Primitive groups of degree 20" to the AMS, Lincoln, NE, 26 Nov 1910; abstract: *Bull. Amer. Math. Soc.* 17:224 #2.
1914 [Bennett, E. R.] Simply transitive primitive groups whose maximal subgroup contains a transitive constituent of order p^2, or pq, or a transitive constituent of degree 5. *Amer. J. Math.* 36:134–36. Reviews: *JFM* 45.0252.02 (L. Bieberbach); *Rev. semestr. publ. math.* 23, pt. 1: 1 (E. B. Cowley). Presented to the AMS, Poughkeepsie, NY, 12 Sep 1911; abstract: *Bull. Amer. Math. Soc.* 18:55 #4.

Abstracts not listed above:
1913a [Bennett, E. R.] The order of the product of two substitutions. *Bull. Amer. Math. Soc.* 19:221 #4. Presented to the AMS, Lawrence, KS, 30 Nov 1912.
1913b [Bennett, E. R.] Transitive groups of degree 107. *Bull. Amer. Math. Soc.* 19:221 #3. Presented to the AMS, Lawrence, KS, 30 Nov 1912.

References to: AmMSc 3–7; AmWom 1935–40; BioWMath.

Other sources: PhD dissertation vita 1912; Owens questionnaire 1937; application for social security account number 1965; Center for Research Libraries College Catalog Collection; communications with University of Illinois Archives, the Bentley Historical Library at the University of Michigan, and Ohio University Archives; *The Semi-Centennial Alumni Record of the University of Illinois (1918)*; Stanford, "The History of the Mathematics Department at the University of Illinois"; US Census 1880, 1900, 1910 PA, 1910 MI, 1920 IL, 1930 MI.

Last modified: August 1, 2009.

GRIFFIN, Harriet. April 6, 1903–January 13, 1991.
Hunter College (BA 1925), Columbia University (MA 1929), New York University (PhD 1939).

Harriet Madeline Griffin was born in Brooklyn, New York, the first of two daughters of Mary Madeline (Gully) (1867–1937) and James Harry Griffin (1872–1936), natives of Brooklyn. Her mother had an elementary school education and became a homemaker after her marriage in 1902. Her father received a high school education; he was a salesman for a furniture store in 1910 and a buyer for a furniture house in 1920. Her sister, Jessie (1904–1971), became a high school mathematics teacher after graduating from Hunter the same year as Harriet. Harriet Griffin recalled in 1985 that her father liked mathematics and encouraged her involvement in the subject.

Harriet Griffin attended Hunter College and while there gave two talks, on the mathematics of time and of astronomy, to the mathematics club and was a member of the Newman Club. She won the Thomas Hunter Prize in Mathematics when she graduated in 1925. She was one of the charter members of Pi Mu Epsilon when it was established at Hunter in 1925 and served as the chapter's first vice-director; in the late 1950s she was one of the councilors-general at the national level.

Griffin remained at Hunter as a tutor 1926–29 and as an instructor 1929–30. She earned her master's degree from Columbia in 1929, having written her master's essay, "Modern Geometry in Three Dimensions." In 1930 the Brooklyn branch of the female-only Hunter College merged with the Brooklyn branch of the male-only City College to become the coeducational Brooklyn College. At that time Griffin moved to a position at the newly opened college, and she remained on the faculty there for thirty-six years. While there she earned her PhD in 1939 at New York University with a dissertation in abstract algebra. At that time she became a member of the Key Pin Society, an honorary society at NYU.

Griffin began her career at Brooklyn College in 1930 as instructor in the women's division. Starting in 1932, the faculty was no longer divided between the men's and women's divisions, and she remained an instructor until 1940. She was assistant professor 1940–50, associate professor 1950–56, professor 1956–66, and professor emeritus after her retirement in 1966. Her teaching included advanced calculus, differential equations, and abstract algebra and theory of matrices, but her major interests lay in the theory of numbers. She is listed on the faculty of the graduate division starting 1946–47. From 1956 to 1964 she taught courses in arithmetic and algebraic theory of numbers and in theory of matrices, and she was advisor for a number of master's theses in number theory in the graduate division at Brooklyn College. She used her own course notes for number theory and for abstract algebra. In addition, Griffin published a textbook in number theory that appeared in both hardback and paperback editions. After Griffin's retirement from Brooklyn College she taught two years, 1966–68, at Molloy College in Rockville Centre, New York.

During World War II, Griffin taught mathematics and did vocational counseling at the United Service Organization in New York. She was a Roman Catholic and was a member of the Albertus Magnus Guild, an organization for Catholics in science. She was also a member of the New York Academy of Sciences.

Harriet Griffin moved to Lakewood, New Jersey, after her retirement. She died in 1991 at age eighty-seven in Kimball Medical Center in Lakewood, having suffered from heart failure. She was survived by two cousins.

Organizational affiliations: AMS, MAA, AAAS (fellow), Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1929 Modern geometry of three dimensions. MA thesis, Columbia University.
1939 The abelian quasi-group. PhD dissertation, New York University, directed by Donald Alexander Flanders. Typescript. Printed version, 1940, reprinted from *Amer. J. Math.* 62:725–37.

Publications:
1931 Review of *Tutorial Exercises in Trigonometry*, by R. W. Brink and E. Thorp. *Amer. Math. Monthly* 38:451.
1940 The abelian quasi-group. *Amer. J. Math.* 62:725–37. Published version of PhD dissertation. Reviews: *JFM* 66.0095.01 (L. Holzer); *MR* 2,127f (H. S. Wall); *Zbl* 024.15004 (H. Ulm). Presented by title to the AMS, Columbus, OH, 29 Dec 1939; abstract: *Bull. Amer. Math. Soc.* 46:43 #74.
1947 *The Concepts of the Theory of Numbers*. Brooklyn, NY: Brooklyn College Press. Rev. ed.: 1949.
1954 *Elementary Theory of Numbers*. International Series in Pure and Applied Mathematics. New York: McGraw-Hill Book Co. Reviews: *Amer. Math. Monthly* 62:132 (V. J. Varineau); *MR* 16,220d (W. Ljunggren); *Scripta Math.* 24:157 (K. M. Herstein); *Zbl* 058.03203 (E. Lamprecht). McGraw-Hill paperback, 1964. Review: *Amer. Math. Monthly* 81:541 (S. Galovich).
1962 *Systems of Abstract Algebra*. Brooklyn, NY: Brooklyn College Book Store.
1965 Discovering properties of the natural numbers. *Arith. Teacher* 12:627–32.
1971 Fractions in s-adic form. *Math. Teacher* 64:572–76.

References to: AmMSc 7–8, 9P–11P; BiDWSci.
"Harriet M. Griffin" in "New Officers of the Fraternity." *Pi Mu Epsilon Journal* 2 (Spring 1957): 281.
"Harriet M. Griffin: Professor, 87." *New York Times*, 22 Jan 1991.

Other sources: Smithsonian questionnaire 1985; Brooklyn College Archives; Hunter College Archives; US Census 1910, 1920, 1930 NY.

Last modified: July 19, 2009.

GRIFFITHS, Lois W. June 27, 1899–November 9, 1981.
University of Washington (BS 1921, MS 1923), University of Chicago (PhD 1927).

Lois Wilfred Griffiths was born in Chagrin Falls, Ohio, the second of two children of Lena (Jones) (1872–1956) and Frederick William Griffiths (1867–1932). Some sources give her mother's birthplace as Iowa and others as Kansas. Her mother graduated from the elementary course at the Kansas State Normal School in Emporia (now Emporia State University) in 1894 and taught school at various times; in 1894 her home address was given as Lehigh, Indian Territory (now Oklahoma). F. W. Griffiths was born in Wales, immigrated to the United States in 1880, did his precollege schooling in New York State, and received a BA degree from Oberlin College in 1893. He earned a BD degree from Oberlin Theological Seminary in 1896 and was ordained a Congregational minister before marrying Lena Jones on December 31, 1896, in Ardmore, Indian Territory (now Oklahoma). F. W. Griffiths was a minister in Michigan 1896–97, in Ohio 1898–99, and in Jennings, Oklahoma Territory, 1899–1900 before traveling for the *Minneapolis Journal* 1900–04. The family moved to Seattle in 1904, and F. W. Griffiths was a pastor for a few years, was vice president of a title guaranty and abstract company 1908–10, and was principal and then superintendent of schools outside of Seattle until 1919. He was senior clerk in the accounting department of a railroad company in Seattle from 1920 until his death a dozen years later. Lois Griffiths' older brother, Harold Frederick, was born in 1898, also in Ohio, and after studying three years at the University of Washington, served in the Navy and later went into business in Seattle.

Lois Griffiths received her elementary and secondary education in the public schools in the state of Washington before entering the University of Washington. Some of the time she was at Washington, she served as assistant to the comptroller of the university. Among her professors was E. T. Bell. She received her bachelor's degree in 1921 and her master's degree two years later.

Griffiths entered the University of Chicago in October 1925 and attended for seven quarters. She completed her dissertation under the direction of L. E. Dickson and in her dissertation vita thanked Professors E. H. Moore, Bell, G. A. Bliss, and Dickson for their guidance and inspiration.

After receiving her doctorate in 1927, Griffiths was immediately hired by Northwestern University in Evanston, Illinois, for what was to be her only teaching position. She was instructor 1927–30, assistant professor 1930–38, associate professor 1938–64, and emeritus associate professor after her retirement in 1964. Her promotion to associate professor came after she had spent part of her 1936–37 sabbatical in Cambridge, England. In 1947 Griffiths published a textbook that was an expansion of typewritten notes she had copyrighted in 1945 as "Determinants and Systems of Linear Equations" and in 1946 as "Introduction to the Theory of Equations." In the late 1940s she produced two additional sets of notes, "Outline of the Theory of Groups" (c1948) and "Matrices and Linear Dependence" (c1949), but did not publish either of them.

Griffiths published a dozen research articles over a twenty-one year period. These articles appeared in the *American Journal of Mathematics*, the *Annals of Mathematics*, and the *Bulletin* of the AMS. In 1942 she published an expository article in the *American Mathematical Monthly* on representing numbers as sums of polygonal

numbers; between 1930 and 1945, seven of her eight research papers were concerned with polygonal numbers. The eighth, "On hypergroups, multigroups, and product systems," appeared in 1938 and was referenced by other authors at least through 1986. From 1939 through the early 1940s, Griffiths also reviewed textbooks for the *National Mathematics Magazine* and regularly served as a referee for the *Bulletin* of the AMS in the early 1930s and for the *Monthly* through most of the 1940s.

At various times Griffiths spoke to both the junior and the senior mathematics clubs at the University of Chicago, to the Northwestern mathematics club, and to the Women's Mathematics Club of Chicago. She was a charter member of the Northwestern chapter of Sigma Delta Epsilon. In 1952 she was given an honorary life membership in the Northwestern University Alumni Association. Her papers at Northwestern University include teaching files, material related to her publications, and mathematical correspondence, particularly with E. T. Bell in the 1940s. She also maintained a close relationship with the University of Chicago and attended seminars and meetings of the senior mathematics club there.

Griffiths and her mother made a trip to Europe in 1935 and returned to the United States in September of that year. Her mother came to live with her in the mid-1940s and remained until her mother's death in Evanston in 1956. In about 1940, Griffiths indicated that her favorite recreation was walking. Acquaintances of Griffiths told one of the authors that she loved to garden and to cook and liked classical music and kept notes on what she listened to on the radio.

Lois Griffiths remained in Evanston after her retirement and died in nearby Skokie in 1981 as a result of heart disease; she was eighty-two years old at the time of her death in the Old Orchard Manor Nursing Home. She bequeathed her house to the University of Chicago and had provided that her body be used for scientific study after her death.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1923 Contact curves of the rational cubic. MS thesis, University of Washington. Typescript. See also **1925**.

1927 Certain quaternary quadratic forms and diophantine equations by generalized quaternion algebras. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Typescript. Abstract: *University of Chicago Abstracts of Theses* (Science Series) 5:37–41. See also **1928**.

Publications:

1925 Contact curves of the rational plane cubic. *Bull. Amer. Math. Soc.* 31:312–17. Published version of MS thesis. Reviews: *JFM* 51.0513.05 (E. Löffler); *Rev. semestr. publ. math.* 32, pt. 2: 14–15 (D. J. Korteweg). Presented to the AMS, Seattle, WA, 22 Dec 1923; abstract: *Bull. Amer. Math. Soc.* 30:196–97 #6.

1928 Generalized quaternion algebras and the theory of numbers. *Amer. J. Math.* 50:303–14. Published version of PhD dissertation. Reviews: *JFM* 54.0164.01 (R. Baer); *Rev. semestr. publ. math.* 34, pt. 1: 4 (W. G. J. ten Pas). Presented by title as "Certain quaternary quadratic forms and diophantine equations" to the AMS, Columbus, OH, 9 Sep 1926; abstract: *Bull. Amer. Math. Soc.* 32:599 #64.

1929 Representation of integers in the form $x^2+2y^2+3z^2+6w^2$. *Amer. J. Math.* 51:61–66. Review: *JFM* 55.0694.04 (O. Gruder). Presented to the AMS, Chicago, 6 Apr 1928; abstract: *Bull. Amer. Math. Soc.* 34:412 #28.

1930 A generalization of the Fermat theorem on polygonal numbers. *Ann. of Math.* 2nd ser., 31:1–12. Review: *JFM* 056.0883.05 (R. Brauer). Parts II and III: **1944** and

1945. Presented as "A generalization of the theorem of Fermat and Cauchy on polygonal numbers" to the AMS, Chicago, 31 Dec 1928; abstract: *Bull. Amer. Math. Soc.* 35:192 #2.
1933 Representation by extended polygonal numbers and by generalized polygonal numbers. *Amer. J. Math.* 55:102–10. Review: *Zbl* 006.10000 (E. Bessel-Hagen). Presented as "A theorem on extended polygonal numbers" to the AMS, Boulder, CO, 29 Aug 1929; abstract: *Bull. Amer. Math. Soc.* 35:767 #35. Also presented as "Certain universal functions of generalized polygonal numbers" to the AMS, Cleveland, OH, 30 Dec 1930; abstract: *Bull. Amer. Math. Soc.* 36:806 #425.
1936 Representation as sums of multiples of generalized polygonal numbers. *Amer. J. Math.* 58:769–82. Reviews: *JFM* 62.1136.02 (H. Behrbohm); *Zbl* 015.20003 (R. Hull). Presented as "Representation by generalized polygonal numbers" to the AMS, Cambridge, MA, 3 Sep 1936; abstract: *Bull. Amer. Math. Soc.* 42 (7, pt. 1): 498 #314.
1938 On hypergroups, multigroups, and product systems. *Amer. J. Math.* 60:345–54. Reviews: *JFM* 64.0056.02 (H. Zassenhaus); *Zbl* 018.39303 (R. Baer). Presented by title to the AMS, Indianapolis, IN, 30 Dec 1937; abstract: *Bull. Amer. Math. Soc.* 44 (1, pt. 1): 33 #21.
1939 Review of *Introduction to the Theory of Groups of Finite Order*, by R. D. Carmichael. *Natl. Math. Mag.* 13:353–54.
1940 Review of *General Analysis, Part II. The Fundamental Notions of General Analysis*, by E. H. Moore and R. W. Barnard. *Natl. Math. Mag.* 14:295–96.
1941a Universal functions of extended polygonal numbers. *Amer. J. Math.* 63:726–28. Reviews: *JFM* 67.0120.01 (H.-H. Ostmann); *MR* 3,161f (D. H. Lehmer); *Zbl* 026.10002 (L. Schrutka).
1941b Review of *An Introduction to Abstract Algebra*, by C. C. MacDuffee. *Natl. Math. Mag.* 15:211–12.
1942a A note on representation by polygonal numbers. *Bull. Amer. Math. Soc.* 48:122–24. Reviews: *MR* 3,268c (D. H. Lehmer); *Zbl* 061.07204 (H. J. A. Duparc). Presented as "The minimum number of variables in universal functions of polygonal numbers" to the AMS, Chicago, 11 Apr 1941; abstract *Bull. Amer. Math. Soc.* 47:380 #212.
1942b Universal functions of polygonal numbers. *Amer. Math. Monthly* 49:107–10. Reviews: *MR* 3,268b (D. H. Lehmer); *Zbl* 061.07205 (H. J. A. Duparc). Presented to the MAA, Chicago, 1 Sep 1941.
1942c Review of *A Survey of Modern Algebra*, by G. Birkhoff and S. Mac Lane. *Natl. Math. Mag.* 16:268–69.
1944 Universal functions of polygonal numbers II. *Amer. J. Math.* 66:97–100. Reviews: *MR* 5,199g (D. H. Lehmer); *Zbl* 060.09606 (H.-H. Ostmann). Parts I and III: **1930** and **1945**.
1945 Universal functions of polygonal numbers III. *Amer. J. Math.* 67:443–49. Reviews: *MR* 7,146d (D. H. Lehmer); *Zbl* 060.09607 (H.-H. Ostmann). Parts I and II: **1930** and **1944**.
1946 A note on linear homogeneous diophantine equations. *Bull. Amer. Math. Soc.* 52:734–36. Reviews: *MR* 8,6d (N. G. de Bruijn); *Zbl* 060.08902 (W. Ljunggren). Presented as "Linear homogeneous diophantine equations" to the AMS, Chicago, 26 Apr 1946; abstract: *Bull. Amer. Math. Soc.* 52 (5, pt. 1): 418 #118.
1947 *Introduction to the Theory of Equations*. Second ed. New York: John Wiley. Reviews: *Amer. Math. Monthly* 55:38–39 (R. L. Wilson); *Sankhya* 9:406–7 (A. Bhattacharyya). Other (typewritten) editions: 1945 (*Determinants and Systems of Linear Equations*) and 1946.

Abstract not listed above:
1929 A theorem on polygonal numbers. *Amer. Math. Monthly* 36:358–59 #6. Presented to a meeting of the MAA, Carthage, IL, 3–4 May 1929.

References to: AmMSc 5–8, 9P–11P; AmWom 1935–40; MacTutor.

Related manuscript material:
Lois W. Griffiths Papers, 1923–1981. Northwestern University Archives, Northwestern University Library, Evanston, Illinois.

Other sources: PhD dissertation vita 1927; Owens questionnaire 1937; Northwestern University Archives; University of Chicago Archives; communication with Oberlin College Archives; US Census 1910, 1920, 1930 WA; Illinois death certificate.

Last modified: January 9, 2016.

GUGGENBUHL, Laura. November 18, 1901–March 8, 1985.
Hunter College (BA 1922), Bryn Mawr College (MA 1924, PhD 1927).

Laura Guggenbuhl (often Guggenbühl until the late 1930s) was the younger of two surviving children (of four born) of Emma Marie (Wildhaber) (b. 1867) and Fritz Guggenbühl (b. 1859), both natives of Switzerland. Her mother had immigrated to the United States in 1887, and her father in 1888, about a year before their marriage. Her brother, Frederick G. W. (1900–1984), was born in New Jersey. According to the 1900 census, in June of that year the parents and infant son were living in Saratoga Springs, New York, where her father was a butcher in a hotel. Laura Guggenbuhl was born the next year in New York City; in 1910 the family of four was living in Manhattan, and her father was a baker in his own bakery. By 1920 her mother was widowed, and the census report of that year indicates that the two children and their mother, who was working as a clerk in a bakery, were still living in Manhattan. Laura's brother, Frederick, became a physician.

Laura Guggenbuhl attended public schools in New York City before entering Hunter College in 1918. While there she was a member of the mathematics club and played basketball. She gave her first talk to the Hunter mathematics club at the end of her first year there. By the end of her second year, she had submitted solutions to problems in the *Monthly* and about that time organized a "Problem Chapter" of the mathematics club. She attended Columbia University in summer 1920 and New York University in 1921. She was a teacher in training at Erasmus Hall High School in Brooklyn January–June 1922 before receiving her bachelor's degree with a major in mathematics from Hunter in 1922. She then began her graduate studies in mathematics at Columbia in summer 1922 in classes given by W. B. Fite and Dunham Jackson. Guggenbuhl was hired as an instructor at Hunter for the year 1922–23 before continuing her graduate studies.

From 1923 to 1926 Guggenbuhl studied at Bryn Mawr College, first as a graduate scholar in mathematics 1923–24 before receiving her master's degree in 1924. She remained at Bryn Mawr as a resident fellow 1924–26. She continued to teach at Hunter during the summers and returned to Hunter as instructor in 1926. The following year she received her PhD in mathematics and education from Bryn Mawr College as Anna Pell Wheeler's third dissertation student. While at Bryn Mawr she also studied with Charlotte A. Scott and D. V. Widder.

Guggenbuhl remained on the faculty at Hunter College until her retirement in 1972. She was instructor 1926–32, assistant professor 1932–59, and associate professor 1959–72. Her research interests were largely in the history of mathematics. In 1950 she published her first historical articles: on Gunstock, the home of the nineteenth-century American astronomer Asaph Hall, and on Euclidean geometry. Several articles followed as well as entries in the *Dictionary of Scientific Biography* on Henri Brocard and Karl Wilhelm Feuerbach. Between 1966 and 1987 sixty-six of her reviews, half of which were in history and biography, appeared in *Mathematical Reviews*; almost three-quarters of these were reviews of articles in Russian with the others in German, Italian, and English.

Guggenbuhl reported in the mid-1960s that she had been a consultant for the Institute of Personality Assessment and Research at the University of California, Berkeley. She was a member of many professional societies and was a frequent participant in meetings. She attended the International Congress of Mathematicians

in Zurich in 1932, Cambridge (USA) in 1950, Amsterdam in 1954, Edinburgh in 1958, Stockholm in 1962, Moscow in 1966, and Nice in 1970. She served as official delegate from Hunter College to the congresses in 1932, 1954, 1962, 1966, and 1970. She made many other trips to Europe as well and reported in *Science* on two meetings she attended: the July 1955 Congress of the French Association for the Advancement of Science, in Caen, and the September 1961 symposium on topology and its relation to modern analysis and algebra, in Prague. She was a member of the New York Academy of Sciences.

In 1939 Guggenbuhl reported her hobbies as travel and photography and her favorite recreations as motoring, swimming, bridge, football, and basketball. She traveled extensively after her retirement and in 1976 participated in a study tour to Canton, People's Republic of China. She was a member of the Metropolitan Museum of Art and the Metropolitan Opera Guild. She was active in Hunter College alumnae activities and held a number of offices including treasurer and member of the board of directors of the Scholarship and Welfare Fund. She was particularly active in fund raising. At various times she was a member of the committee for the Bryn Mawr College Endowment Fund; was chairman of the Hunter College Faculty Committee on Community Funds; and was chairman of the Ways and Means Committee, which involved fund raising, for the New York City Branch of AAUW. She was a Protestant. The last several years of her life she lived in White Plains, New York, as did her brother and his wife.

On May 6, 1985, Laura Guggenbuhl's sister-in-law wrote to Bryn Mawr College. "This is a difficult missive to write. . . . Her brother Dr. Frederick Guggenbuhl died last Sept. 1984. We were overcome with grief and took a 3 mo. round-the-world cruise thinking it would help our grief. However, it did not and Dr. Laura died March 8th as the Queen Elizabeth II was leaving Hong Kong. . . . She was a brilliant woman and a dear kindly person and will be missed greatly" (Bryn Mawr College Archives, Alumnae Association Files).

Organizational affiliations: AMS, MAA, Deutsch. Math.-Verein., Soc. Math. France, Soc. Math. Suisse, AAAS, French Assoc. for the Adv. of Sci., Swiss Assoc. for the Adv. of Sci., Hist. Sci. Soc., Coll. Public Relations Assoc., AAAS, AAUW, Pi Mu Epsilon.

Dissertation:

1927 An integral equation with an associated integral condition. PhD dissertation, Bryn Mawr College, directed by Anna Pell Wheeler. Printed version, 1927, reprinted from *Ann. of Math.* 2nd ser., 29:21–37.

Publications:

1927 An integral equation with an associated integral condition. *Ann. of Math.* 2nd ser., 29:21–37. Published version of PhD dissertation. Reviews: *JFM* 53.0359.01 (B. M. Wilson); *Rev. semestr. publ. math.* 34, pt. 1: 65 (W. A. Wythoff).

1929 (Translator from the French) Hermite: On the transcendence of e. In *A Source Book in Mathematics*, ed. D. E. Smith, 99–106. New York: McGraw-Hill Book Co. Reprint: 1959. New York: Dover Publications.

1930 Review of *Plane Trigonometry*, by J. B. Rosenbach and E. A. Whitman. *Amer. Math. Monthly* 37:93–94.

1937 The failure in required mathematics at Hunter College. *Math. Teacher* 30:68–75.

1939 Review of *The Romance of the Calendar*, by P. W. Wilson. *Scripta Math.* 6:232–34.

1950a Gunstock 1769. *Connecticut Antiquarian* 2 (1): 19–21.

1950b Two thousand years a best seller. *Bull. of the Near East Soc.* 3 (8): 3–4.

1951 *Concerning notes de bibliography* [sic] *des courbes géométriques by H. Brocard*. New York, privately printed.
1953 Henri Brocard and the geometry of the triangle. *Math. Gaz.* 37:241–43. Presented to the ICM, Amsterdam, 6 Sep 1954; abstract: *Proceedings of the International Congress of Mathematicians, 1954, Amsterdam, September 2–September 9* 2:420–21. Reprint: in *The Changing Shape of Geometry: Celebrating a Century of Geometry and Geometry Teaching*, ed. C. Pritchard, 146–49. Cambridge: Cambridge Univ. Press, 2003.
1955 Karl Wilhelm Feuerbach, mathematician. *Sci. Monthly* 81:71–76. Presented by title as "Karl Wilhelm Feuerbach (1800–1834), mathematician," to the AAAS, Boston, MA, 29 Dec 1953. Reprint: in *Circles: A Mathematical View*, by D. Pedoe, rev. ed., 89–100. Washington, DC: Mathematical Association of America, 1995. Review of book: *Math. Mag.* (P. J. Campbell).
1957a Note on the Gergonne point of a triangle. *Amer. Math. Monthly* 64:192–93.
1957b Review of *The Tree of Mathematics*, ed. G. James. *Scripta Math.* 23:217.
1957c An unusual application of a simple geometric principle. *Math. Teacher* 50:322–24.
1958 Reuter, Gauss, and Göttingen. *Math. Teacher* 51:603–606.
1959a Gergonne, founder of the *Annales de Mathématiques*. *Math. Teacher* 52:621–29.
1959b International Congress of Mathematicians, Edinburgh, 1958. *Math. Teacher* 52:190–96.
1961a The international colloquium on differential geometry and topology in Zurich and the celebration of the fiftieth anniversary of the Swiss Mathematical Society. *Math. Teacher* 54:363–65.
1961b Journey to Delos. *Math. Teacher* 54:91–97.
1964 The New York fragments of the Rhind mathematical papyrus. *Math. Teacher* 57:406–10.
1965 Mathematics in ancient Egypt: a checklist (1930–1965). *Math. Teacher* 58:630–34.
1970 Brocard, Pierre René Jean-Baptiste Henri. In: *Dictionary of Scientific Biography* 2:478–80.
1971 Feuerbach, Karl Wilhelm. In: *Dictionary of Scientific Biography* 4:601–2.
1973 Rereading Rhind. Review of *Mathematics in the Time of the Pharoahs*, by R. J. Gillings. *Isis* 64:533–34.
1977 Review of *The Method of Analysis: Its Geometrical Origin and Its General Significance*, by J. Hintikka and U. Remes. *Isis* 68:308–9.

References to: AmMSc 5–8, 9P–11P; AmMWSc 12P–13P; AmWom 1935–40.

Other sources: PhD dissertation vita 1927; Owens questionnaire 1937; Bryn Mawr College Archives; US Census 1900, 1910, 1920 NY.

Last modified: August 4, 2009.

GURNEY, Margaret. October 28, 1908–March 19, 2002.
Swarthmore College (BA 1930), Brown University (MA 1931, PhD 1934).

Margaret Gurney was the eldest of three children of Anna Elizabeth (Pickett) (1885–1966) and Dayton Alvin Gurney (1883–1965), both natives of Michigan. Her parents both graduated from the State Agricultural College in Michigan (now Michigan State University); her mother received a bachelor's degree in 1905; her father received a bachelor's degree and a master's degree. Margaret Gurney noted in a conversation with one of the authors in 1996 that her mother, who had been good in mathematics, had gone to college at age fifteen and her father at age sixteen. Her parents married on September 7, 1907, and Margaret was born just over a year later in Washington, D.C. Her siblings, John O. (1911–1992) and Ruth H. (1913–1995), were also born there while her father was an engineer in the US War Department. He later became chief engineer in the Ordnance Office. Margaret Gurney's brother received a BS degree from the University of Michigan in 1933 and became a mechanical engineer with the US Department of Defense; her sister attended the University of Maryland and El Camino College in California, married, and had a family.

Margaret Gurney attended public schools and graduated from Central High School in Washington, D.C., in 1926. She held a White open scholarship for women at Swarthmore College 1926–30 and graduated with highest honors in mathematics, physics, and astronomy in 1930. In the 1996 conversation, Gurney, who had planned to be a Latin major, credited Arnold Dresden at Swarthmore with being an inspiration for her in mathematics. Gurney studied at Brown University, where she was a University junior fellow 1930–31, earned her master's degree in 1931, and continued her graduate studies as a Joshua Lippincott fellow from Swarthmore College 1931–32. Two articles by Gurney appeared in 1932 dealing with convergence and summability in series.

In 1932–33 Gurney studied at the university in Göttingen as a Miss Abbott's School Alumnae fellow from Pembroke College, Brown University. While there she met Hans Lewy, a privat-docent at Göttingen, who had received his doctorate there in 1926. In 1933 Gurney returned to Brown to continue her graduate work. Lewy also went to Brown at that time. He was a research associate 1933–35 before moving to the University of California for the remainder of his career. Gurney worked extensively with Lewy as she completed her work for the PhD in 1934 with a dissertation in partial differential equations directed by J. D. Tamarkin. In 1938 Lewy referred to her unpublished dissertation in an article in the *Transactions* of the AMS (43:437–64).

Gurney's first jobs after receiving her doctorate were as a teacher in girls' preparatory schools. She taught at Ogontz School in Ogontz, Pennsylvania, just northwest of Philadelphia, 1935–36, and at Wykeham Rise School in Washington, Connecticut, 1936–38.

In 1938 Gurney began her government career, in which she was to work in statistics with an emphasis in sampling. She passed her civil service examination in statistics even though she had had no official statistics courses. She first worked for the US Bureau of the Budget in Washington, D.C., as statistical consultant 1938–40 and as economist 1940–44. In 1944 she moved to the US Bureau of the Census, where she was a mathematical statistician until her retirement in about 1973. Much of her work at the census bureau involved planning and implementing

sample surveys in demographic and economic fields. As part of her job, Gurney programmed on the first Univac I, which had been built by the Eckert–Mauchly Computer Corporation for the Bureau of the Census, and which became operational in 1951.

In addition to her work at the Bureau of the Census, Gurney taught a course in sampling theory as a visiting lecturer at Stanford University in 1952 and worked many years as a consultant. She served as a consultant in Puerto Rico for the Bureau of Labor Statistics, US Department of Labor, six times in the period 1961–71. During the period 1962–76, she was a consultant for the US Agency for International Development. She was in Thailand in 1962 and the Dominican Republic in 1963. She gave a workshop in household sample surveys to Latin-American statisticians in Mexico City from February to April 1965. She was in Brazil in 1971 and 1976; in Kenya, Uganda, and Ethiopia in 1968 and 1970; and in Vietnam in 1972. Much of her consulting work dealt with aspects of agricultural census, sampling, and the computation of reliability.

Gurney was much honored for her work at the census bureau. In February 1966 she was awarded a US Department of Commerce Silver Medal for "her continuous contributions to the theory and application of sample survey methods over a long period" (*Amer. Statist.* 20 no. 2 (1966): 9), and in 1968 she was elected a fellow of the American Statistical Association "for distinguished contributions to the theory of recurrent sample surveys, to the measurement of nonsampling errors, and to training programs of foreign statisticians in sample surveys of their own countries" (*Amer. Statist.* 22 no. 4 (1966): 48). Prior to receiving these honors, Gurney had been active in the Washington Statistical Society, a chapter of the American Statistical Association (ASA). She served as the secretary-treasurer 1949–53 and as a representative-at-large to the executive committee 1952–53. She was also a referee for the *Journal* of the ASA and was the Washington correspondent for *The American Statistician*, the news publication of the ASA.

In the late 1970s Gurney moved to Quilcene, Washington, on the Olympic Peninsula, near her sister. She died in Quilcene in 2002 at age ninety-three, survived by nieces and nephews. Her obituary described her as having an "active spiritual life," having attended Episcopal churches in Maryland, in Washington, D.C., and in Port Townsend, Washington. It also noted that her pastimes included reading mystery novels, gardening, weaving, knitting, crocheting, and needlepoint, and that she had been a member of the National Association for Retired Federal Employees, the Order of the Eastern Star, and the local Grange.

Organizational affiliations: AMS, ASA, IMS, Inter-American Statistical Institute, International Association of Survey Statisticians, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1931 An introduction to factorial series. Master's thesis, Brown University. Typescript.

1934 Some general existence theorems for partial differential equations of hyperbolic type. PhD dissertation, Brown University, directed by Jacob David Tamarkin. Typescript.

Publications:

1932a Cesaro summability of double series. *Bull. Amer. Math. Soc.* 38:825–27. Reviews: *JFM* 58.0231.03 (F. Lösch); *Zbl* 006.05201 (L. Leja).

1932b A non-uniformly convergent series. *Amer. Math. Monthly* 39:108–109. Review: *JFM* 58.0216.01 (H. Falckenberg).

1943 with W. E. Deming. Government standards of sampling practice in the United States. *Estadística* 1 (2): 124–26.

1946 with M. H. Hansen and W. N. Hurwitz. Problems and methods of the sample survey of business. *J. Amer. Statist. Assoc.* 41:173–89. Correction: 41:529. Presented to the ASA, Cleveland, OH, 26 Jan 1946; abstracts: *J. of Marketing* 11:203 #24.2, 11:301–2 #24.1.
1951 with T. Dalenius. The problem of optimum stratification II. *Skand. Aktuar.* 34:133–48. Reviews: *MR* 14,64e (W. G. Cochran); *Zbl* 044.34103 (M.-P. Geppert).
1955 with M. Bershad. Within-P.S.U. variance of the composite estimate. *J. Amer. Statist. Assoc.* 50:718–19, Appendix to "The redesign of the census current population survey" by M. H. Hansen, W. N. Hurwitz, H. Nisselson, and J. Steinberg, 701–19.
1962 with J. Steinberg and W. Perkins. The accuracy of the 1960 census count. *Proc. Social Statist. Sect.* (Amer. Statist. Assoc.) 76–79. Presented to the ASA, Minneapolis, MN, 9 Sep 1962; summary: *J. Amer. Statist. Assoc.* 58:562.
1965 with J. F. Daly. A multivariate approach to estimation in periodic sample surveys. *Proc. Social Statist. Sect.* (Amer. Statist. Assoc.) 242–57. Presented to the ASA, Philadelphia, PA, 11 Sep 1965; summary: *J. Amer. Statist. Assoc.* 61:546.
1969 with B. F. Tepping. Max A. Bershad, 1913–1969. *Amer. Statist.* 23 (4): 49.
1975 with R. S. Jewett. Constructing orthogonal replications for variance estimation. *J. Amer. Statist. Assoc.* 70:819–21. Review: *Zbl* 322.62014 (Autorreferat).

Technical reports:
1962 The variance of the replication method for estimating variances from the CPS design. Dittoed memorandum. US Bureau of the Census.
1963a The current population survey, a report on methodology. Bureau of the Census Technical Paper 7. Washington, DC.
1963b With B. Gura and A. D. Casey. Report on the 1960 censuses of the Dominican Republic and on the National Statistical Office. US Bureau of the Census.
1964 McCarthy's orthogonal replications for estimating variances, with grouped strata. Dittoed memorandum. US Bureau of the Census.
1966 Atlantida: A case study in household sample surveys, Unit IV, Sample design. US Bureau of the Census. Series ISP01, No. 1-E. Washington, DC. Based on materials prepared by the US Bureau of the Census under the auspices of the US Agency for International Development. Presented in collaboration with the Inter-American Statistical Institute at workshop, 15 Feb–9 Apr 1965, Mexico City.
1972 Sampling applications of the 1970 census publications, maps, and public use summary files. Bureau of the Census Technical Paper 27. Washington, DC. Abstract: *Popul. Index* 38 (1972) #4560.

Presentation not listed above:
1972 with M. E. Gonzalez. Estimates for samples from frames where some units have multiple listings. Presented to the ASA, Montreal, QC, Canada, 15 Aug 1972.

References to: AmMSc 10S–11S; AmMWSc 12S, 13P, 14–15.
"Margaret Gurney." (Obituary) *Port Angeles* (*WA*) *Peninsula Daily News*, 24 Mar 2002.

Other sources: PhD dissertation vita 1934; Owens questionnaires 1937, 1940; authors' questionnaire 1992; conversation with author, 14 Aug 1996, Quilcene, WA; Brown University Archives; "Washington Statistical Society, Past and Present, 1896 to 2012"; US Census 1920 DC; SSDI.

Last modified: January 15, 2016.

HAGEN, Beatrice L. July 4, 1899–July 22, 1987.
University of Kansas (BA 1920), University of Chicago (MA 1926, PhD 1930).

Beatrice Liberty Hagen was the youngest child of Lena (Sessler) (1865–1948), originally from Illinois, and Louis Hagen, born in Wisconsin in 1857. She was born in Barton County, near Ellinwood, in central Kansas, where her father was a farmer. In the 1900 census it was reported that her parents had been married sixteen years and that there were four children living of five born. They were Bertha (1884–1973), Charles (1890–1951), Maude (1892–1974), and Beatrice. All were born in Kansas.

Beatrice Hagen received her elementary and secondary education in public schools and graduated from Ellinwood High School in 1916. She then attended the University of Kansas, where Wealthy Babcock was one year ahead of her; Florence Black was an instructor and graduate student during Hagen's final two years at Kansas. After receiving her bachelor's degree in 1920, she taught in Kansas high schools; she was in Burlington 1920–22 and in Dodge City 1923–24.

In 1924 Hagen entered the University of Chicago, where she studied for the next two years and received her master's degree in 1926, having written a thesis with E. P. Lane. She then taught at Ozark Wesleyan College in Carthage, Missouri, in 1926–27. Ozark Wesleyan had opened the previous year and closed in 1932. She also taught at Nebraska State Normal College (now Chadron State College) in Chadron 1928–29. After further study at Chicago and completing a dissertation in projective differential geometry directed by Lane, she received her PhD in 1930.

Hagen's first position after her degree was at Fort Hays Kansas State College (now Fort Hays State University) 1930–31. In 1931 she took a position as instructor at Pennsylvania State College (now Pennsylvania State University), where she remained until her retirement in 1959. She was promoted to assistant professor in 1940, to associate professor in 1945, and to professor in 1956, three years before her retirement. Among her female colleagues at Penn State were Helen Brewster Owens, Teresa Cohen, Aline Huke Frink, and Ethel Moody. It appears that in the late 1940s Hagen gave a speech on women in astronomy to the local chapter of Sigma Delta Epsilon (now Sigma Delta Epsilon-Graduate Women in Science) at Penn State. The text of her talk appears in the Owens Papers.

Hagen was appointed a temporary associate professor at Kansas State University in Manhattan after her retirement from Penn State and taught there 1960–62. In 1964 she moved to Great Bend, Kansas, where she made a home with her two sisters, Bertha and Maude. Bertha had remained in the area, cared for her parents, and helped with the family farm. Maude, who attended the University of Kansas, was a French teacher in Hiawatha, Kansas; she moved to Great Bend after her retirement. Both Beatrice and Maude did tutoring after retiring. Beatrice Hagen was a member of the Sunshine Club in Ellinwood, about ten miles from Great Bend, and was a Presbyterian. In 1940 she described herself as a Republican.

In a February 14, 1978, letter to one of the authors, Beatrice Hagen reported that "women were quite frankly advised not to enter the higher fields of mathematics, physics and chemistry because there was difficulty in obtaining satisfactory positions." She also noted that "World War II and committee work filled my time, plus the feeling that what I did in the line of research was not very important made most of my 'playthings' go unpublished. Only a few people do important research."

Not all of her research went unpublished; in 1941 an article with Ruth B. Rasmusen, a fellow student of E. P. Lane, appeared in the *Bulletin* of the AMS.

Beatrice Hagen died at the Ellinwood District Hospital a few days after her eighty-eighth birthday. She was the last of her immediate family and was survived by several cousins. She was buried in the Lakin-Comanche District Cemetery in Ellinwood.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, AAUW, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1926 Transformation from conjugate to asymptotic parameters. MA thesis, University of Chicago, directed by Ernest Preston Lane. Typescript.
1930 Quintuples of three-dimensional varieties in a four-dimensional linear space. PhD dissertation, University of Chicago, directed by Ernest Preston Lane. Typescript. Private edition, 1932, distributed by the University of Chicago Libraries.

Publications:
1940 with C. C. Wagner, E. Johnson, Jr., and C. H. Graves. *Introduction to Statistics.* State College, PA: Pennsylvania State College. Subsequent eds.: 1941, 1944, 1949, 1952.
1941 with R. B. Rasmusen. Comments on canonical lines. *Bull. Amer. Math. Soc.* 47:298–302. Reviews: *JFM* 67.0651.03 (E. Salkowski); *MR* 2,301b (J. L. Vanderslice); *Zbl* 025.08301 (W. Haack).
1943a Review of *Logarithms, Trigonometry, Statistics*, by H. R. Cooley, P. H. Graham, F. W. John, and A. Tilley. *Amer. Math. Monthly* 50:322–23.
1943b Review of *Plane Trigonometry, Solid Geometry, and Spherical Trigonometry*, by W. W. Hart and W. L. Hart. *Amer. Math. Monthly* 50:450–51.

References to: AmMSc 5–8, 9P–11P; AmWom 1935–40.
"Beatrice L. Hagen." (Obituary) unidentified newspaper clipping.

Other sources: Master's thesis vita 1926; PhD dissertation vita 1932; Owens questionnaire 1937; Owens Papers; personal correspondence with author 1977–78; communication with Charles W. Sessler, cousin and administrator of Beatrice Hagen estate; US Census 1900, 1910, 1920 KS, 1930 IL.

Last modified: March 25, 2009.

HALLER, Mary E. June 15, 1901–June 16, 1970.
University of Washington (BA 1924, MS 1931, PhD 1934).

Mary Elizabeth Haller was born in Cumberland, Maryland, the second of at least four daughters of Winifred (Buckey) (b. 1875) and William Henry Haller (b. 1875), both of Maryland. Her elder sister, Elsie C., was three years older than she; her younger sisters were Isabella, about three years younger, and Winifred R., about eight years younger. Her father worked for the railroad, as a clerk in 1900 and as a telegraph operator in 1910.

Haller attended public schools in Cumberland, Maryland, and graduated from Allegany County High School in 1916. The next two years she was enrolled in the Frostburg State Normal School (now Frostburg State University) in Frostburg, Maryland, from which she graduated in 1918. She taught in elementary schools for the next five years. She was an instructor in the public schools in Maryland 1918–20 and in Renton, Washington, 1920–23. While teaching in Renton, near Seattle, she attended the University of Washington and in 1924 earned her bachelor's degree in education with a major in mathematics and a minor in economics. The next five years, 1924–29, Haller taught in the high school in Renton and, after successfully teaching and demonstrating professional growth, earned the Washington State Life Diploma.

In 1929 Haller returned to the University of Washington, where she was a teaching fellow in the mathematics department 1929–31 while she worked toward her 1931 master's degree with a thesis in projective geometry and a minor in physics. While continuing her graduate work at the University of Washington she was an associate in mathematics 1931–34 and a Loretta Denny fellow 1933–34. She received her PhD in 1934 with a minor in physics and with a doctoral dissertation in algebraic geometry directed by R. M. Winger, who also directed her master's thesis.

In 1934–35 Haller was professor and dean of women at Gooding College in Idaho. At the time she was there the college was under pressure to offer non-academic subjects; it closed three years later. It appears that she studied at the University of Chicago in the summer of 1935. After her year at Gooding, Haller returned to the University of Washington where she was instructor 1935–41, assistant professor 1941–49, associate professor 1949–65, and associate professor emeritus after her retirement in December 1965. Haller was among fourteen faculty members whose teaching was recognized in "Class Acts" in the September 1999 issue of *Columns*, the University of Washington alumni magazine. A tribute from a student describes his experience in about 1947:

> The "Doc," as she was known, had a reputation for working students to death and I was more than apprehensive about attending her lectures.
>
> About 20 students arrived at the first scheduled class meeting . . . All of a sudden, here comes an imposing figure of a woman without the least bit of friendliness on her face. She wrote her name on the blackboard, turned to the class and said in firm tones, "My name is Dr. Mary Haller and I want you to be advised right now that all of you will do twice as much work as any other class, you will not miss a class unless you are near death, if you even drop a pencil

> during one of my lectures, you might as well transfer to another class. Now, those of you who don't like my terms are free to go without prejudice."
>
> At the end of her announcement, at least 10 of the assembled group left the room without even a glance to see who was crazy enough to remain. When the door to the classroom finally closed, "Doc" turned to us and with a great big smile said, "Now that we've ridden ourselves of the quitters, let's get started. I assure all of you that surviving this class will be a feather in your cap, and you will become good engineers." True to her word, our class became as one and lifelong friendships started. (House, "Class Acts: Mary Haller")

In 1945 Haller's signature was one of eighteen on a petition asking for the formation of the Pacific Northwest Section of the MAA, and during the 1950s she attended many of the section meetings. Her continued interest in physics was demonstrated the summer before her promotion to associate professor when Haller attended a three-day symposium on electro-magnetic theory at MIT that was sponsored by the AMS, the American Institute of Electrical Engineers, the American Institute of Physics, and the Institute of Radio Engineers.

In addition to the organizational affiliations listed below, Haller belonged to Zeta Mu Tau, a local mathematics honor society; Sigma Pi Sigma, a national physics honor society; and Pi Lambda Theta, a national honor and professional association in education. She was also a member of the American Society for Engineering Education. She was a Methodist and a member of the Wesley Club and Kappa Phi, a club for Christian university women.

Haller remained in Seattle after her retirement and died as a consequence of heart disease at Swedish Hospital in Seattle in 1970, the day after her sixty-ninth birthday.

Organizational affiliations: AMS, MAA, AAUW, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1931 Sextics invariant under the icosahedral group and its sub-group the dihedral group of order ten. MS thesis, University of Washington, directed by Roy Martin Winger.
1934 Self-projective rational octavics. PhD dissertation, University of Washington, directed by Roy Martin Winger. See also **1936**.

Publication:
1936 Self-projective rational octavics. *Tôhoku Math. J.* 42:38-53. Published version of PhD dissertation. Reviews: *JFM* 62.0764.01 (E. A. Weiss); *Zbl* 014.22603 (E. G. Togliatti). Presented to the AMS, Seattle, WA, 18 Jun 1936; abstract: *Bull. Amer. Math. Soc.* 42:346 #249.

References to: AmMSc 6–8, 9P–11P; WhoAmW 1–2.

Other sources: PhD dissertation vita 1934; Owens questionnaire 1937; communication with University of Washington Archives; "History of the Pacific Northwest Section of the Mathematical Association of America"; Thomas E. House and R. B. Kieburtz, "Class Acts: Mary Haller" *Columns*, September 1999; Robert A. Pedersen, "Haller Revealed," *Columns*, December 1999; US Census 1900, 1910, 1920 MD, 1930 WA; Washington death certificate.

Last modified: July 20, 2009.

HARSHBARGER, Frances. August 16, 1902–February 11, 1987.
Grinnell College (BA 1923), West Virginia University (MA 1925), University of Illinois (PhD 1930).

Frances Harshbarger was born in Quimby, Iowa, the middle child of Annie W. (b. 1870) and Charles C. Harshbarger (b. 1871), both natives of Iowa. Two years separated her from her older brother, Henry, and from her younger sister, Emily. Her father was a bank cashier.

After graduating from Grinnell College in Iowa in 1923, Harshbarger was at West Virginia University for the next two years, where she taught half time and did graduate work in mathematics. She received her master's degree in 1925 and spent the next two years in Keyser, West Virginia, as head of the mathematics department of Potomac State School, a junior college that was established as a preparatory school for West Virginia University in 1901. It was also known as Potomac State College, which later became its official name; it is now a division of the university.

In 1927 Harshbarger went to the University of Illinois, where she was an assistant until 1929 and then a fellow for the year 1929–30. Her dissertation in algebraic geometry was written under the direction of A. B. Coble; she minored in physics.

After receiving her PhD in 1930, Harshbarger went to Istanbul, Turkey, where she was a professor in the American College for Girls (also known as Constantinople Woman's College) 1930–34. After she left the school, she was replaced by Henrietta Terry (Nee), who had just received her PhD from Illinois. Upon Harshbarger's return to the United States, she taught at the high school associated with the University of Chicago.

In the fall of 1935, Harshbarger was appointed instructor at Kent State University in Ohio. She was assistant professor 1936–42, associate professor 1942–46, and professor 1946–72. She was designated emeritus professor upon her retirement in 1972.

After her death at age eighty-four in 1987 in the Cuyahoga Falls General Hospital in Ohio, Frances Harshbarger was buried in Woodbine, Iowa. Donations in her memory were directed to the United Methodist Church in Kent.

Organizational affiliations: AMS, MAA, AAUP, Phi Beta Kappa, Sigma Xi.

Dissertation:
1930 The geometric configuration defined by a special algebraic relation of genus four. PhD dissertation, University of Illinois, directed by Arthur Byron Coble. Printed version, 1931, reprinted from *Trans. Amer. Math. Soc.* 33:557–78.

Publication:
1931 The geometric configuration defined by a special algebraic relation of genus four. *Trans. Amer. Math. Soc.* 33:557–78. Published version of PhD dissertation. Reviews: *JFM* 57.0837.01 (R. Weitzenböck; *Zbl* 001.40203 (E. A. Weiss). Presented by title to the AMS, New York City, 28 Feb 1931; abstract: *Bull. Amer. Math. Soc.* 37:170 #134.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P–13P.

Other sources: PhD dissertation vita 1931; communication with Kent State University Archives; US Census 1900, 1910, 1920, 1930 IA.

Last modified: December 11, 2008.

HASEMAN, Mary Gertrude. March 6, 1889–April 9, 1979.
Indiana University (BA 1910), Bryn Mawr College (PhD 1917).

Mary Gertrude Haseman, was born in or near Linton, Indiana, the seventh of nine children of Elizabeth Christine (Schultze) (1853–1929) and John Dieterich (also Diedrich, Diederich) Haseman (1847–1924), both born near Linton. Her siblings were Joseph H. (1876–1972); William Peter (1878–1932); Charles (1880–1931); John D. Jr. (1882–1969); Leonard (1884–1969); Oscar (1886–1967); Bertha (1891–1970); and Arthur (1895–1969). All nine children from this farm family in central Indiana were college educated, and five of them earned doctorates. Gertrude Haseman's six older brothers all received bachelor's degrees from Indiana University; five also earned master's degrees from Indiana. Four of the six earned PhD's: William Peter from the University of Pennsylvania in physics in 1907, Charles from Göttingen in mathematics in 1907, Leonard from Cornell in entomology in 1910, and John from Columbia in zoology in 1911. Her younger brother and sister both earned master's degrees.

Gertrude Haseman attended high school in Linton, where her oldest brother was superintendent of schools. She entered Indiana University in 1907 and graduated cum laude in mathematics in 1910. Cora Hennel and Gertrude McCain were fellow students at Indiana; Hennel was a graduate student the entire time Haseman was an undergraduate, while McCain was a senior 1907–08 and returned for a short period in 1909 as a graduate student. Haseman first took a position as professor of mathematics at Vincennes University, then a two-year college in southwestern Indiana, for the year 1910–11.

From 1911 to 1915 Haseman was a graduate student at Bryn Mawr College: as a graduate scholar in mathematics 1911–12 and as a resident fellow 1913–1915. She worked as a tutor in the Bryn Mawr Tutoring School from 1912 to 1915. During her first year at Bryn Mawr, she gave presentations to the journal club on projective groups in three dimensions and on a method of successive approximations or iteration; her fellow graduate student presenters that year were Gertrude I. McCain and Eula A. Weeks (King). In 1913–14 she reported on two papers by A. Kneser in algebraic geometry. She attended lectures of Frank Morley, and probably also Arthur Coble, at the Johns Hopkins University during 1915–17, while she also taught at the Roland Park Country School in Baltimore. She wrote her dissertation under the direction of Charlotte A. Scott and passed her final examination in May 1916. Although her doctorate was not awarded by Bryn Mawr until 1917, her name was submitted to *School and Society* for their "list of American doctorates conferred during the academic year 1915–1916" and appears on the list of doctorates in mathematics published in the *Bulletin* of the AMS (23 (1917): 197). Haseman noted in her dissertation vita that at Bryn Mawr she also studied under the direction of J. R. Conner in mathematics and W. B. Huff in physics, the subject in which she minored.

The results of Haseman's dissertation have appeared in books and papers in knot theory, especially since the mid-1980s. In a 1988 review in the *Bulletin* of the AMS of two such books, Joan Birman noted that T. P. Kirkman, C. N. Little, and Haseman "assembled the first tables of knots, which have been used ever since, and can be seen, modulo surprisingly few corrections, at the end of both of the books under review.... Empirical data is of course at the heart of any subject, and so

this set of painfully assembled data has had an enormous impact on the subject" (19:552). In an essay in *The History and Science of Knots*, Pieter van der Griend describes her work as a "brave expedition into the then uncharted regions of 12-crossing knot-projections" and calls her dissertation "charming" (1995, 223). Both of her publications are now available through the University of Edinburgh School of Mathematics website on Knot Theory.

In 1917–18 Haseman taught at the Harcum School in Bryn Mawr and during 1918–19 at the high school in Linton, Indiana. She joined the University of Illinois faculty as instructor in 1920. While there she studied during two summers in the early 1920s at the University of Chicago, hearing lectures of E. J. Wilczynski and E. H. Moore. While she was at Illinois, Haseman and a colleague, Josephine Burns Glasgow, spoke at an MAA meeting about preparing students to take calculus who had minimal mathematics in high school. They also produced a mimeographed mathematics text, *Freshman Mathematics: Book 1*, which is in the library at Southern Illinois University Edwardsville. Haseman spoke at another MAA meeting about curve tracing and wrote a paper on that subject, a copy of which is in the University of Illinois mathematics library; the paper is based on a course of lectures given at Bryn Mawr by Charlotte Scott. In 1925 and 1926 Haseman served as second vice president of Sigma Delta Epsilon, the graduate women's scientific fraternity.

Haseman resigned her position at Illinois on October 28, 1927, and left on January 31, 1928. February 1 was the opening day for the new Junior College of Connecticut (now the University of Bridgeport), and Haseman had been hired as its first professor of mathematics. She was there briefly before serving as professor of mathematics and advisor of women at Hartwick College in Oneonta, New York, during the academic year 1928–29. She left after that year, with evidence suggesting a dispute with the college administration. The April 1929 issue of the student newspaper, *Hilltops of Hartwick*, contained the dedication, "To Dr. Mary Gertrude Haseman who, by her unfailing patience and encouragement has endeared herself to both students and faculty of Hartwick College." She was replaced at Hartwick by Roxanna Vivian.

After leaving Hartwick, Gertrude Haseman spent some time with her brother, Leonard Haseman, who was then head of the department of entomology at the University of Missouri in Columbia. A nephew reported that she held a teaching job in the south before returning in the summer of 1936 to live in her former home in Linton, where she remained until about the last year of her life. Some of the time one of her brothers was there; later she lived alone and was cared for by two nephews.

In a conversation with one of the authors in 1986, a nephew said Haseman played piano and harp and was very musical. He said she was interested in lawn work and that she gardened, canned, and was a good cook. Never in the hospital before her final illness, she spent about the last year of her life in a nursing home before her death at age ninety at Greene County General Hospital in Linton. Her siblings predeceased her, and her only survivors were nieces and nephews. She is buried, along with several family members, in Memory Hill Cemetery in Linton.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, Sigma Xi.

Dissertation:

1916 On knots with a census of the amphicheirals with twelve crossings. PhD dissertation, Bryn Mawr College, directed by Charlotte Angas Scott. Printed version, 1918, Neill

and Co., Edinburgh, reprinted from *Trans. Roy. Soc. Edinburgh* 52 (1917): 235–55. PhD granted 1917.

Publications:
1917 On knots, with a census of the amphicheirals with twelve crossings. *Trans. Roy. Soc. Edinburgh* 52, pt. I (11): 235–55. Published version of PhD dissertation. Presented, probably by title, to the Royal Soc. Edinburgh, 4 Jun 1917.
1919 Amphicheiral knots. *Trans. Royal Soc. Edinburgh* 52, pt. III (23): 597–602. Presented, probably by title, to the Royal Soc. Edinburgh, 4 Nov 1918.

Abstracts not listed above: :
1926 with J. B. Glasgow. Freshman mathematics for students with one year of high school algebra. *Amer. Math. Monthly* 33:394 #8. Presented to a meeting of the MAA, Decatur, IL, 7–8 May 1926.
1927 Curve tracing. *Amer. Math. Monthly* 34:394 #1. Presented to a meeting of the MAA, Bloomington, IL, and Normal, IL, 13–14 May 1927.

References to: AmMSc 3.
Obituary. *Linton Daily Citizen*, 10 Apr 1979.
Przytycki, Józef H. "Little and Haseman – early American tabulators of knots."
Hongler, Cam Van Quach and Claude Weber. "Amphicheirals According to Tait and Haseman." *J. Knot Theory and Its Ramifications* 17 (2008): 1387–1400.

Other sources: PhD dissertation vita 1917; Bryn Mawr College Archives; Indiana University Archives; University of Illinois Archives; communication with Indiana University Alumni Association; author's conversation with James Haseman, nephew, in Linton, 23 June 1986; Memory Hill Cemetery, Linton, Indiana; communication between Joe Haseman and Patricia Kenschaft, 5 Jan 1981; *Biographical Memoirs of Greene County, Ind. with Reminiscences of Pioneer Days*, v. III (Indianapolis: B. F. Bowen, 1908), 1203–06; Joan S. Birman, Review: Gerhard Burde and Heiner Zieschang, *Knots*, and Louis H. Kauffman, *On Knots*, *Bull. Amer. Math. Soc.* 19 (1988): 550–58; Pieter van der Griend, "A history of topological knot theory," in *History and Science of Knots*, eds. J. C. Turner and P. van der Griend (Singapore: World Scientific, 1996), 205–60; US Census 1880, 1900, 1910, 1920 IN; SSDI.

Last modified: January 8, 2016.

HAYNES, Nola (Anderson). January 9, 1897–December 21, 1996.
University of Missouri (BS 1922, MA 1926, PhD 1929).

Nola Lee Anderson was the second of five children of Mary Estella (Swan) (1866–1946) and Edward Lee Anderson (1867–1945), a farmer. Her mother was born in Michigan, while her father, she, and her siblings were born in or near Bucklin in Linn County in north-central Missouri. Both parents had an elementary school education; they were married in 1894. Nola Anderson's older sister, Mary Ellen (1895–1918), had contracted polio when an infant. Her only brother, Morton Albert (1899–1967), received a high school education and became a farmer. Her younger sisters, Selma Lucille (1909–1996) and Elma Peach (b. 1911), both received bachelor's degrees from the University of Missouri. Selma Anderson became a teacher and homemaker, while Elma Anderson received a second bachelor's degree in library science from the University of Illinois and was a librarian.

Nola Anderson received her early education in a one-room schoolhouse and graduated from the high school in Bucklin in 1915. In 1981 she described her early education. "My father would buy corn and ship cattle. He had me do a lot of the adding and figuring ... and I liked it. I liked, of course, the arithmetic at school. I went to a very small town high school that was just a two-year high school when I started. But they added on the junior year and the senior year ... and I was in the first [four-year] graduating class.... Then the pattern of the day was you took examinations to get certificates and you could go out and teach in the rural schools. So I did that and taught for four years at a rural school" (Smithsonian meeting tapes).

Anderson enrolled at the University of Missouri in the fall of 1919, at the age of twenty-two, and graduated three years later with a BS in education. She taught mathematics for two years at the high school in St. Charles, Missouri; the following year she had charge of the mathematics department at Central College for Women, a junior college in Lexington, Missouri. She then returned to the University of Missouri to study mathematics and astronomy and received her MA after one year. She continued her graduate studies as a university scholar in mathematics in 1926–27, as a Gregory scholar in 1927–28, and as an instructor in 1928–29. Her dissertation committee consisted of her advisor, Louis Ingold, a 1907 Chicago PhD, and W. D. A. Westfall, G. E. Wahlin, and E. S. Haynes, who represented her minor field of astronomy. Anderson remained at the University of Missouri as an instructor for one more year after receiving her doctorate in 1929.

In 1930 Anderson joined the faculty at H. Sophie Newcomb College, Tulane University, in New Orleans as associate professor and acting chair of the department. She remained for the next eight years as associate professor 1930–36 and as professor 1936–38; she also served as department chair during her years at Newcomb. In her first years at Newcomb College, Anderson supervised a master's thesis in geometry. She became active in the Louisiana-Mississippi Section of the MAA and served as secretary 1931–32 and vice chairman for Louisiana 1937–38.

When Anderson went to Newcomb in 1930, Anna Mayme Howe had just left after eleven years as an assistant professor, and Marie J. Weiss had just arrived as an assistant professor. During 1934–35 Weiss was on leave to spend the year at Bryn Mawr College working with Emmy Noether, and Anderson hired Vera Ames (Widder) as her replacement for the year. In 1936 Weiss left for an assistant

professorship at Vassar College, and Anderson hired M. Gweneth Humphreys as an instructor to replace Weiss. When Anderson left Newcomb in 1938, Marie Weiss returned as professor and mathematics department head.

While at Newcomb, Anderson remained in contact with E. S. Haynes, who had served on her dissertation committee. Eli Stuart Haynes, born in Missouri in 1880, received his bachelor's and master's degrees from the University of Missouri in 1905 and 1907, respectively, and his PhD in astronomy from the University of California in 1913. After nearly a decade at Beloit College he returned to the University of Missouri in 1923 as professor of astronomy and director of the Laws Observatory. After nearly twenty-six years of marriage and with two grown sons, Haynes was widowed in 1934. Nola Anderson left Newcomb College at the end of the 1937–38 school year and married Haynes on July 9, 1938. Her marriage was announced in the October 1938 issue of the *Monthly*.

Nola Anderson Haynes then moved to Columbia, Missouri. She described her expectations and experiences there in 1981.

> When I left Newcomb College I left to get married to the chairman of the astronomy department of the University of Missouri. There was a very strict nepotism law and I was giving up my career for marriage, thinking I would never teach again. Then when the Second World War came on ... I was the first person called back into teaching. At that time they didn't set any salaries and they gave me the name of acting instructor or something like that because of the nepotism law. I thought it was a temporary sort of thing and then after the war the boys came back and I was still an acting associate professor ... because of my husband. It was not until my husband retired that I got the appointment of associate professor.... There was a very strict nepotism law at the University of Missouri; not only did it include wives, but if you had a niece or a cousin on staff - only one could be on the staff. (Smithsonian meeting tapes)

In 1943–44 she was a special instructor; from 1946 to 1951 she served as acting associate professor; and in 1951, after her husband's retirement in 1950, she became the first woman at the University of Missouri to hold the title of associate professor of mathematics. In 1952 she was elected to a one-year term as secretary-treasurer of the Missouri Section of the MAA. She served again as secretary-treasurer of the section 1960–63 and chairman 1963–64.

E. S. Haynes died in 1956, and Nola Haynes continued teaching until her retirement as emeritus associate professor in 1967, at age seventy. During her last years of teaching at Missouri she taught honors sections and, in 1959, participated in a panel discussion at a joint meeting of the NCTM and NEA on "Helping the better pupil toward higher goals." After her retirement she served one year, 1967–68, as professor at Randolph-Macon Woman's College (now Randolph College), where her former colleague M. Gweneth Humphreys chaired the department.

Nola Haynes was a member of Pi Lambda Theta, an education honor society. She was also a member of the National Society of Colonial Dames of America and was listed on their Honor Roll in 1980. Locally, she served as president of the Boone County League of Women Voters and was a member of the Fortnightly Club and Readers' Club of Columbia. She was also a member of the First Christian Church in Columbia, where she was an honorary deaconess. She established the Eli Stuart

Haynes and Nola Anderson Haynes Scholarship Fund at Missouri and in 1995 was awarded the first College of Arts and Science Silver Chalk Award for contributions in teaching.

Nola Haynes died in Brookfield, Missouri, in December 1966, less than three weeks before her hundredth birthday. She was survived by her youngest sister, of nearby Marceline, Missouri, and a stepson of Port Angeles, Washington. She was buried in Memorial Park Cemetery, Columbia, Missouri.

Organizational affiliations: AMS, MAA, Sigma Xi, Sigma Delta Epsilon, Pi Mu Epsilon.

Thesis and dissertation:
1926 [Anderson, N. L.] Invariants in four-dimensional space. MA thesis, University of Missouri. Typescript.
1929 [Anderson, N. L.] An extension of Maschke's symbolism. PhD dissertation, University of Missouri, directed by Louis Ingold. Typescript. Printed version, 1929, reprinted from *Amer. J. Math.* 51:123–38.

Publications:
1929a [Anderson, N. L.] An extension of Maschke's symbolism. *Amer. J. Math.* 51:123–38. Published version of PhD dissertation. Reviews: *JFM* 55.0439.02 (W. Fr. Meyer); *Rev. semestr. publ. math.* 35:2 (W. G. J. ten Pas). Presented as "An extension of Maschke's symbolic method" to the AMS, Lincoln, NE, 27 Nov 1926; abstract: *Bull. Amer. Math. Soc.* 33:163 #4.
1929b [Anderson, N. L.] The trigonometry of hyperspace. *Amer. Math. Monthly* 36:517–23. Review: *JFM* 55.0429.02 (G. Feigl). Presented to the MAA, St. Louis, MO, 26 Nov 1927; abstract: *Amer. Math. Monthly* 35:52 #2.
1936 [Anderson, N. L.] with L. Ingold. Normals to a space V_n in hyperspace. *Bull. Amer. Math. Soc.* 42:429–35. Reviews: *JFM* 62.0865.01 (J. Haantjes); *Zbl* 015.12603 (D. J. Struik). Presented as "First normal spaces in Riemannian geometry" by N. L. Anderson to the AMS, Lawrence, KS, 1 Dec 1928; abstract: *Bull. Amer. Math. Soc.* 35:145–46 #2. Also presented as "Invariant normals to a space S_n contained in a function space" to the AMS, Des Moines, IA, 31 Dec 1929; abstract: *Bull. Amer. Math. Soc.* 36:210 #165.

Abstract not listed above:
1951 An attempt to broaden the background of prospective teachers of mathematics. *Amer. Math. Monthly* 58:594 #4. Presented to the MAA, Fayette, MO, 6 Apr 1951.

Presentation not listed above:
Trigonometry in a space of n-dimensions. Presented to the MAA, Natchitoches, LA, 13 Mar 1931.

References to: AmMSc 6–8, 9P–12P; BioWMath; WhoScEn 1.
Moen, Nancy. "Better at Math 'Than the Boys.'" *Critical Points*, Spring 1996, Mathematics Department, University of Missouri, Columbia.
Obituary. *Kansas City Star*, 23 Dec 1996.
"Remembering Nola Haynes." *Critical Points*, Summer 1997, Mathematics Department, University of Missouri, Columbia.

Other sources: PhD dissertation vita 1929; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; WhAm 3 (Haynes, Eli Stuart); US Census 1900, 1910, 1920 MO.

Last modified: December 11, 2008.

HAZLETT, Olive C. October 27, 1890–March 8, 1974.
Radcliffe College (BA 1912), University of Chicago (MS 1913, PhD 1915).

Olive Clio Hazlett was born in Cincinnati, Ohio, the only child of Olive Leonora (Binkley) (1866–1954) and Robert Hazlett (b. 1862), both natives of Ohio. Her parents married in November 1888. Around the time of Olive C. Hazlett's birth in 1890, her father was a postal clerk for the Railway Mail Service in Cincinnati. In 1898 her mother graduated from the Laura Memorial Woman's Medical College in Cincinnati (after several mergers, now the University of Cincinnati College of Medicine) and was licensed to practice in Ohio and in Massachusetts. The following year, Olive Clio Hazlett moved with her mother to the Boston area. In 1900 her mother was a physician at the Reformatory Prison for Women in Sherborn, Massachusetts, while her father, a postal clerk, was enumerated with his family in Zanesville, Ohio. Robert Hazlett was deceased by March 1905.

Olive C. Hazlett attended public schools in Massachusetts, including Malden High School 1904–05. She and her mother spent September 1905 through August 1906 traveling in France and England, and then she attended Dorchester High School in Boston 1906–09. After graduating in 1909, she entered Radcliffe College. At Radcliffe, she specialized in mathematics and had advanced courses with Harvard professors W. E. Byerly, B. O. Peirce, and W. F. Osgood. She was elected to Phi Beta Kappa and graduated magna cum laude in 1912. A letter written January 18, 1916, indicates that Hazlett spoke of herself as having "done mathematics ever since she was a child" (M. Carey Thomas to Charlotte A. Scott, Thomas Papers, Microfilm Edition, Reel 134).

During 1912–15 Hazlett did graduate work in mathematics and mathematical astronomy at the University of Chicago. She held a graduate scholarship from Chicago the first year and received her master's degree in 1913. The next two years she held a graduate fellowship from Chicago, and during her final year she also held a Boston alumnae fellowship awarded by the Boston branch of the Association of Collegiate Alumnae (later the American Association of University Women). She received her PhD magna cum laude in 1915. The majority of her courses were with E. H. Moore and L. E. Dickson in mathematics and with F. R. Moulton in astronomy. Both her master's thesis and her doctoral dissertation concerned the characterization of certain types of algebras and were directed by Dickson. Hazlett was Dickson's second female doctoral student, following by two years Mildred Leonora Sanderson, who died in October 1914 after one semester as an instructor at Wisconsin.

In 1915–16, the year after she received her PhD, Hazlett was an Alice Freeman Palmer memorial fellow of Wellesley College for postdoctoral study at Harvard University. By 1916 she had published three papers about linear associative algebras and was later to become the most prolific of the women working in pure mathematics among those who earned PhD's in mathematics before 1940. Her later work concerned modular invariants and covariants.

In February 1916, Hazlett was offered a two-year appointment as an associate in mathematics at Bryn Mawr College. Hazlett was not reappointed in 1918, but was hired by Mount Holyoke College in South Hadley, Massachusetts. At the same time, Anna J. Pell (Wheeler) moved from Mount Holyoke to Bryn Mawr as associate professor. At Mount Holyoke, Hazlett was assistant professor 1918–24 and associate professor 1924–25. During most of her time at Mount Holyoke, Hazlett

and her mother, who was experiencing some health problems, were living in the nearby town of Holyoke, Massachusetts. In addition to her regular classroom teaching responsibilities at Mount Holyoke, Hazlett directed much of the work of the mathematics honors students.

Hazlett's years at Mount Holyoke were to be some of her most productive research years, and her accomplishments were acknowledged by the mathematics community. In 1920 she was awarded $100 by the American Association for the Advancement of Science "in support of her work in the theory of hypercomplex numbers and invariants" (*Bull. Amer. Math. Soc.* 26:467); she also published half a dozen major research papers while at Mount Holyoke. Her work in invariants and modular analysis was recognized by O. D. Kellogg in his 1921 article, "A decade of American mathematics," in *Science*. In addition, her long tenure as cooperating editor (also called associate editor) of the *Transactions* of the AMS began with the January 1923 issue. In short, she was a major figure in algebra in the United States.

By late winter in 1925 Hazlett was looking for another position. She indicated in a letter to E. J. Townsend, the department chair at Illinois, on April 10, 1925, that her only reason for considering leaving Mount Holyoke was so she would have better research opportunities, namely, a better library and contact with other mathematicians doing research. A letter of March 5, 1925, to Townsend from the American College Bureau had inquired whether they would consider hiring a woman for the following year and had noted that Dickson had written that she is "one of the two most noted women in America in the field of Mathematics" (Personnel file, University of Illinois Department of Mathematics records).

Hazlett had written to Townsend earlier describing her many academic achievements. On March 18, 1925, she noted that she had read at least one paper a year before the AMS since 1915 and attended meetings on the average of twice a year. She also noted her participation in the 1924 International Congress of Mathematicians in Toronto, as well as her position on the editorial committee of the *Transactions* of the AMS. She mentioned, too, that she was a member of committee G of AAUP, which she described as concerned with "increasing the intellectual interest and raising the intellectual standards of the undergraduate" (Personnel file, University of Illinois Department of Mathematics records).

L. E. Dickson wrote to Townsend on her behalf on March 30, 1925. Among his comments are those concerning her mathematics, teaching, and certain aspects of her character and personal life.

> . . . She has shown more independence in research than any of our Doctors for [the] past ten years – and has published perhaps a dozen excellent papers in several branches of algebra showing real originality and the ability to attack successfully quite fundamental problems. Her tested ability and her continued eagerness for research make it certain she will have a very successful career in research. . . .
>
> Miss H. has been a bit unhappy at times, partly on acct of very poor math library at her school, & partly because her taking care of her mother has made it hard for her to make ends meet on a modest salary. . . .
>
> During the 2 years or more that Miss H. was here, I always found her to be quite a normal person, easy to get on with. . . . The

> drawback that she has been at times a bit unhappy (for reasons cited) would I am sure be completely remedied by her transfer to a place like U. Ill., since she is so eager to get to a live place with a real library. . . .
>
> I am sure she would have the greatest respect & consideration for her colleagues in your dept. Also that she would be most conscientious in her teaching & in carrying out the wishes of the head of her dept.
>
> I think it certain you couldn't find so competent a research person as she without calling a full professor (& not many of latter are her equal.) Her circumstances require a salary of at least $3000 – & she is worth much more. . . .
>
> A person of such high math. ability deserves a post in a leading math. dept. Since she is most kind hearted & considerate, I would fear no difficulty in her relations to colleagues & students. (Personnel file, University of Illinois Department of Mathematics records)

In 1925 Hazlett took a demotion in rank to join the faculty at the University of Illinois, and on January 1, 1926, she was elected to a three-year term as a member of the council of the AMS. She was promoted to associate professor in 1929 and was associate professor emeritus after her formal retirement from Illinois in 1959. In 1927 she was "starred" for mathematics in *American Men of Science*, one of only three women "starred" in that field before 1940. The others were Charlotte Scott in 1903 and Anna J. Pell (later Anna Pell Wheeler) in 1921.

In addition to her other teaching, Hazlett taught a graduate course in the theory of numbers during the academic year 1927–28. In January 1928 she requested a leave from the University of Illinois for study in Europe and received a Guggenheim fellowship for 1928–29 "for the study of the arithmetics of linear associative algebras together with their application and interpretation in other lines of mathematics, especially the theory of numbers" (*Bull. Amer. Math. Soc.* 34:388). She sailed from New York to Genoa in June 1928 and spent the summer in the Italian Alps with her mother. On September 1, 1928, Hazlett arrived in Bologna where she presented a paper at the International Congress of Mathematicians. Following a tour of Florence and other Italian towns, she arrived in Rome on September 22 and remained there for most of the year except for a few weeks in Zurich. She had hoped to meet with Emmy Noether in Göttingen to discuss their work, but learned that Noether was in Moscow in the winter of 1928–29. Realizing that she would not be able to accomplish everything she wanted by September 1929, Hazlett applied for and received a one year renewal of her Guggenheim "for continuation of studies of the arithmetics of linear associative algebras" (*Bull. Amer. Math. Soc.* 35:743). She also received a second leave of absence from Illinois under the condition that she promise to return to the University and with a commitment for a promotion to associate professor with an increase in salary. During her second year in Europe she also studied in Göttingen.

When Hazlett resumed her work at Illinois, she received the promised promotion and raise, but her teaching was less satisfying, since she wanted more work with advanced students and less with elementary students. At this time her research productivity diminished.

Hazlett's mother had broken her leg during the summer and remained in Rome after Hazlett returned to Illinois. R. D. Carmichael, the department head at this time, wrote to Olive B. Hazlett in early January 1931 informing her that her daughter had not been very well since her return to Illinois in September and that she had not had energy for her research, but that she seemed to be improving. During the following few years Hazlett remained in her position at Illinois. However, in a letter on December 11, 1936, Arthur B. Coble, the head of the mathematics department, wrote to A. C. Willard, the university president that he was "very sorry to report that Professor Olive C. Hazlett has suffered a nervous breakdown and that her physician ... says that in all likelihood she will not be able to resume her duties before June" (Personnel file, University of Illinois Department of Mathematics records). Hazlett was granted a leave of absence for illness December 1, 1936, through August 1937; the leave was with pay, but her salary was reduced to cover expenses for her replacements. After about a week in the university hospital, she was taken to Rogers Memorial Sanitarium in Oconomowoc, Wisconsin, where she remained for several months before spending some time in Chicago. In spring 1937 she asked to extend the leave of absence until September 1938, and the leave was granted. In May 1937 a blow to Hazlett was the death of Herbert Slaught, the University of Chicago mathematics professor in whose home Hazlett had lived her last two years at Chicago. Although Hazlett had asked for and received a leave without pay, she found herself with financial troubles in autumn 1937, largely because she needed to contribute to the support of her mother.

Hazlett spent most of the year 1937–38 in Colorado, first in Denver and then in Estes Park. Although Hazlett had no official doctoral students, during the period that she was on leave Donald Meeker Brown finished his dissertation, *Arithmetics of Rational Generalized Quaternion Division Algebras*, under the direction of Henry R. Brahana but wrote in the "Acknowledgments" of his "appreciation of the guidance furnished by Professor Olive C. Hazlett in preparing [him] for the solution of the problem considered in this dissertation."

Hazlett returned to work at Illinois in September 1938. After a few years, however, she was committed by court order on November 20, 1944, to the Neuropsychiatric Institute of the University of Illinois in Chicago. At some point she was given a conditional parole but was committed by the Champaign County Court on March 13, 1945, to the Kankakee State Hospital in Kankakee, Illinois. She was on a temporary disability leave with pay until May 1945, after which she was on permanent disability leave until her retirement in the late 1950s.

In 1953, with the help of a Kankakee physician and attorney, Hazlett petitioned for her own release from the state hospital. A petition for a writ of habeas corpus was filed on September 23, 1953, and after a hearing and evidence, the court found the "petitioner not mentally ill and therefore illegally restrained of her liberties" (Record 55, p. 344, filed October 2, 1953, Clerk of the Circuit Court, Kankakee County). She was discharged from custody after which she moved to her cabin, Timeless Lodge, in Peterborough, New Hampshire. Her mother died in Boston less than a year later.

Olive C. Hazlett was described by Lucretia Levy, a former colleague and office mate for a year, as a kind and gentle lady and a pleasant office mate who seemed very much alone. Hazlett's interests were varied. In 1937 she described them as "rock climbing especially above timberline and when the technique is pressure climbing;

landscape photography, especially working across the light or into the light; Oriental rugs and other" (Owens questionnaire). In about 1940 Hazlett described herself as a Socialist and as an Anglo-Catholic. After Hazlett moved to New Hampshire, she was befriended by several local Discalced Carmelite brothers and was deeply involved as a lay woman in the order. At the time of her death she was a member of the Carmelite Third Order, an organization of lay people known as Tertiaries.

After living in Peterborough for nearly two decades, Hazlett spent some months in a Keene, New Hampshire, nursing home before her death there at eighty-three in 1974. She was buried in Peterborough. In 1984 Olive C. Hazlett was one of three mathematicians whose lives were celebrated in Case-of-the-Month, "Commemorating American Mathematics," exhibited in the Smithsonian Institution's National Museum of American History. A photograph of that case and objects that belonged to Hazlett can be seen online at Olive C. Hazlett: Music and Puzzles.

Organizational affiliations: AMS, MAA (charter member), Circ. Mat. di Palermo, Deutsch. Mat.-Verein., Edinburgh Math. Soc., London Math. Soc., AAAS (fellow), Phi Beta Kappa, Sigma Xi, Sigma Delta Epsilon, Pi Mu Epsilon.

Thesis and dissertation:

1913 Invariants which characterize linear associative algebras of a small number of units. MS thesis, University of Chicago, directed by Leonard Eugene Dickson. Typescript. See also **1914**.

1915 On the classification and invariantive characterization of nilpotent algebras. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Printed version, 1916, reprinted from *Amer. J. Math.* 38:109–38.

Publications:

1914 Invariantive characterization of some linear associative algebras. *Ann. of Math.* 2nd ser., 16:1-6. Published version of MS thesis. Reviews: *JFM* 45.0238.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 23, pt. 2: 11 (W. A. Wythoff). Presented as "Invariants which characterize some linear associative algebras" to the AMS, Chicago, 26 Dec 1913; abstract: *Bull. Amer. Math. Soc.* 20:307–8 #5.

1916a On the classification and invariantive characterization of nilpotent algebras. *Amer. J. Math.* 38:109–38. Published version of PhD dissertation. Reviews: *JFM* 46.0183.02 (A. Speiser); *Rev. semestr. publ. math.* 25, pt. 1: 5 (E. B. Cowley).

1916b On the rational, integral invariants of nilpotent algebras. *Ann. of Math.* 2nd ser., 18:81–98. Reviews: *JFM* 46.0183.04 (G. Szegö); *Rev. semestr. publ. math.* 25, pt. 2: 10 (W. A. Wythoff). Presented as "On the fundamental invariants of nilpotent algebras in a small number of units" to the AMS, New York City, 27 Dec 1915; abstract: *Bull. Amer. Math. Soc.* 22:271–72 #16; review of abstract: *JFM* 46.0187.03 (G. Szegö).

1917 On the theory of associative division algebras. *Trans. Amer. Math. Soc.* 18:167–76. Reviews: *JFM* 46.0183.03 (A. Speiser) 46:183; *Rev. semestr. publ. math.* 26, pt. 1: 9 (P. Mulder). Presented to the AMS, Cambridge, MA, 4 Sep 1916; abstract: *Bull. Amer. Math. Soc.* 23:62 #3; review of abstract: *JFM* 46.0187.03 (G. Szegö).

1918 On scalar and vector covariants of linear algebras. *Trans. Amer. Math. Soc.* 19:408–20. Reviews: *JFM* 46.0153.03 (W. Fr. Meyer); *Rev. semestr. publ. math.* 27, pt. 2: 10 (P. Mulder). Presented as "On rational integral invariants and covariants of the general linear algebra" to the AMS, New York City, 27 Dec 1917; abstract: *Bull. Amer. Math. Soc.* 24:272–73 #14. Presented by title as "On vector covariants" to the AMS, New York City, 23 Feb 1918; abstract: *Bull. Amer. Math. Soc.* 24:370 #2; review of abstract: *JFM* 46.1143.01 (G. Szegö).

1920 A theorem on modular covariants. *Trans. Amer. Math. Soc.* 21:247–54. Reviews: *JFM* 47.0085.02 (E. Noether); *Rev. semestr. publ. math.* 29, pt. 1: 10 (P. Mulder). Presented by title to the AMS, Chicago, 28 Dec 1918; abstract: *Bull. Amer. Math. Soc.* 25:246–47 #6.

1921a Associated forms in the general theory of modular covariants. *Amer. J. Math.* 43:189–98. Reviews: *JFM* 48.0103.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 29, pt. 2: 2, 30, pt. 1: 1 (E. B. Cowley). Presented as "Some pseudo-finiteness theorems in the general theory of modular covariants" to the AMS, New York City, 31 Dec 1919; abstract: *Bull. Amer. Math. Soc.* 26:257 #33.

1921b New proofs of certain finiteness theorems in the theory of modular covariants. *Trans. Amer. Math. Soc.* 22:144–57. Reviews: *JFM* 48.0104.01 (E. Noether); *Rev. semestr. publ. math.* 29, pt. 2: 9 (P. Mulder). Presented to the AMS, New York City, 25 Oct 1919; abstract: *Bull. Amer. Math. Soc.* 26:147–48 #3.

1922a Annihilators of modular invariants and covariants. *Ann. of Math.* 2nd ser., 23:198–211. Reviews: *JFM* 49.0072.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 31, pt. 1: 13 (W. A. Wythoff). Presented as "Annihilators of modular invariants" to the AMS, Chicago, 7 Sep 1920; abstract: *Bull. Amer. Math. Soc.* 27:56 #10.

1922b Replies. (In Questions and Discussions) *Amer. Math. Monthly* 29:117–18.

1922c A symbolic theory of formal modular covariants. *Trans. Amer. Math. Soc.* 24:286–311. Errata: 30 (1928): 855. Reviews: *JFM* 50.0058.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 31, pt. 2: 16 (P. Mulder). Presented as "A symbolic notation in the theory of formal modular invariants" to the AMS, Chicago, 8 Sep 1920; abstract: *Bull. Amer. Math. Soc.* 27:64 #31. Presented as "A symbolic theory of formal modular invariants" to the AMS, Toronto, ON, Canada, 28 Dec 1921; abstract: *Bull. Amer. Math. Soc.* 28:164 #31. Presented as "Finiteness theorems for formal modular covariants" to the AMS, Cambridge, MA, 28 Dec 1922, Harvard Univ.; abstract: *Bull. Amer. Math. Soc.* 29:109 #28.

1924 Two recent books on algebras. Review of *Algebras and their Arithmetics*, by L. E. Dickson, and *Corpi Numerici e Algebre*, by G. Scorza. *Bull. Amer. Math. Soc.* 30:263–70.

1926 The arithmetic of a general algebra. *Ann. of Math.* 2nd ser., 28:92–102. Reviews: *JFM* 52.0135.02 (K. Fenchel-Sperling); *Rev. semestr. publ. math.* 33, pt. 2: 29 (W. A. Wythoff). Presented as "Note on the arithmetic of an associative algebra over any algebraic field" to the AMS, Kansas City, MO, 29 Dec 1925; abstract: *Bull. Amer. Math. Soc.* 32:114 #42.

1927 Notes on formal modular protomorphs. *Amer. J. Math.* 49:181–88. Reviews: *JFM* 53.0099.03 (A. Loewy); *Rev. semestr. publ. math.* 33, pt. 2: 2 (W. G. J. ten Pas). Presented by title as "Formal modular protomorphs" at meeting of the AMS, Columbus, OH, 9 Sep 1926; abstract: *Bull. Amer. Math. Soc.* 32:588 #24.

1928a On the arithmetic of a general associative algebra. In *Proceedings of the International Mathematical Congress Toronto 1924*, ed. J. C. Fields, 1:185–91. Toronto: Univ. of Toronto Press. Review: *JFM* 54.0161.02 (E. Pannwitz). Presented to the ICM, Toronto, ON, Canada, 11–16 Aug 1924.

1928b Review of *Algebra. Vol. 1: Die Grundlagen. Vol. 2: Theorie der algebraischen Gleichungen*, by O. Perron. *Bull. Amer. Math. Soc.* 34:115–16.

1929a Homogeneous polynomials with a multiplication theorem. *Trans. Amer. Math. Soc.* 31:223–32. Review: *JFM* 55.0668.01 (K. Fenchel-Sperling). Presented as "On the composition of polynomials" to the AMS, Philadelphia, PA, 29 Dec 1926; abstract: *Bull. Amer. Math. Soc.* 33:148 #47.

1929b Quaternions. In *Encyclopedia Britannica*, 14th ed., 18:834–35.

1930a Integers as matrices. In *Atti del Congresso Internazionale dei Matematici Bologna 3–10 Settembre 1928 (VI)*, ed. N. Zanichelli, 2:57–62. Bologna. Review: *JFM* 56.0146.03 (A. Scholz). Presented to the ICM, Bologna, Italy, 5 Sep 1928.

1930b On division algebras. *Tran. Amer. Math. Soc.* 32:912–25. Review: *JFM* 56.0146.02 (K. Fenchel-Sperling). Presented as "On the types of division algebras" to the AMS, New York City, 2 May 1925; abstract: *Bull. Amer. Math. Soc.* 31:482 #4.
1930c On formal modular invariants. *J. Math. Pures Appl.* 9th ser., 9:327–32. Review: *JFM* 56.0125.01 (W. Specht). Presented as "On formal modular invariants for the general binary form with respect to $GF(p^n)$" to the AMS, Kansas City, MO, 29 Dec 1925; abstract: *Bull. Amer. Math. Soc.* 32:108 #17. Presented by title as "Note on formal modular invariants" to the AMS, Philadelphia, PA, 29 Dec 1926; abstract: *Bull. Amer. Math. Soc.* 33:148 #48. Presented by title as "Note on formal modular invariants" to the AMS, Nashville, TN, 28 Dec 1927; abstract: *Bull. Amer. Math. Soc.* 34:135 #2.
1932 Review of *Algebra. Vol. 1: Die Grundlagen*, 2nd rev. ed., by O. Perron. *Bull. Amer. Math. Soc.* 38:623–24.
1933 Rutherford on modular invariants. Review of *Modular Invariants*, by D. E. Rutherford. *Bull. Amer. Math. Soc.* 39:839–42.
1940 Review of *Irrationalzahlen*, 2nd rev. ed., by O. Perron. *Bull. Amer. Math. Soc.* 46:15.

Abstracts not listed above:
1917 On Huntington's set of postulates for abstract geometry. *Bull. Amer. Math. Soc.* 23:439–40 #9. Presented to the AMS, New York City, 28 Apr 1917. Review: *JFM* 46.0825.06 (G. Szegö).
1924 On associated forms in the theory of formal modular covariants. *Bull. Amer. Math. Soc.* 30:212 #27. Presented to a meeting of the AMS, New York City, 27–28 Dec 1923.
1925 Formal modular covariants as algebraic invariants. *Bull. Amer. Math. Soc.* 31:219 #31. Presented by title to a meeting of the AMS, Washington, DC, 29 Dec 1924 – 1 Jan 1925.
1927 Ideals for any linear associative algebra. *Bull. Amer. Math. Soc.* 33:148 #49. Presented to the AMS, Philadelphia, PA, 29 Dec 1926.
1928 Algebras A defined over an algebra B. *Bull. Amer. Math. Soc.* 34:135 #3. Presented by title to the AMS, Nashville, TN, 28 Dec 1927.

References to: AmMSc 3–8, 9P–11P; AmWom 1935–40; AmWomSc; BiDWSci; BioWMath; DcWomW; MacTutor; NotMat; NotSci 2; NotTwCS 1S; NotWoSc; Sc&ItsT 6; Poggendorff 6, 7b; WomScSearch; WomWorHis.
"Dr. Olive Hazlett." (Obituary) *New York Times*, 12 Mar 1974.
"In Memory: '12, Olive C. Hazlett." *Radcliffe Quarterly*, June 1974, 33.
"Olive C. Hazlett: Music and Puzzles. In *Women Mathematicians and NMAH Collections* (NMAH Object Group).
"Mathematical Recreations – Olive C. Hazlett." In *Mathematical Objects Relating to Charter Members of the MAA* (NMAH Object Group).

Related manuscript materials:
Olive C. Hazlett Papers, 1926-28, 1964, 1974, Record Series Number: 15/14/28. University of Illinois Archives, Urbana, IL.
Olive C. Hazlett Collection, LHM Institute, Georgetown, TX.

Other sources: MS thesis vita 1913; PhD dissertation vita 1916; Owens questionnaire 1937; conversations with former colleagues Josephine Chanler on 24 Mar 1983, J. L. Doob on 25 Mar 1983, P. W. Ketchum on 23 Mar 1983, Lucretia Levy on 24 Mar 1983, in Urbana, IL; Bryn Mawr College Archives (M. Carey Thomas Papers, Microfilm Edition); University of Chicago Archives (E. H. Moore Papers); University of Illinois Archives; Smithsonian Institution Archives (National Museum of American History, Division of Physical Sciences and Mathematics, Records); University of Illinois Department of Mathematics records; Circuit Court of Kankakee County, IL; communications with Cincinnati Medical Heritage Center, Massachusetts Document Retrieval, and with Clerk of the Circuit Court of Champaign County, IL; "Fellowship Awards for this Year," extracts from letter from

Miss Maltby in "Report of the Committee on Fellowships," *J. Assoc. Coll. Alum.* 9 (1916): 35; O. D. Kellogg, "A decade of American mathematics," *Science* n.s., 53 (1921): 541–48; Maltby, *History of the Fellowships*; Bell, "Fifty Years of Algebra in America, 1888–1938"; Jeanne LaDuke, "The Study of Linear Associative Algebras in the United States, 1870–1927" in *Emmy Noether in Bryn Mawr*, eds. Bhama Srinivasan and Judith Sally, 147–59, (New York: Springer-Verlag, 1983); Green and LaDuke, "Contributors to American Mathematics"; Massachusetts Death Record Abstract (Olive B. Hazlett); US Census 1900 OH, 1900, 1910 MA; SSDI.

Last modified: January 13, 2016.

HEDBERG, Marguerite (Zeigel). August 27, 1907–August 27, 2002.
Delta State Teachers College (BS 1928), University of Missouri (MA 1929, PhD 1932).

Marguerite Lenore Zeigel was born in Kirksville, Missouri, the second of four children of Elizabeth (Neef) (1879–1975) and William Henry Zeigel (1875–1947), natives of Missouri who married in 1900. Her father received a bachelor's degree in 1900 from Missouri Valley College and a master's degree in 1904 from the University of Missouri. From 1917 to 1925 he was a teacher, dean, and head of the mathematics department at the State Teachers College in Kirksville, Missouri. In 1924 her father earned a PhD from George Peabody College for Teachers; the following year he became dean and head of the Department of Education at Delta State Teachers College (now Delta State University) in Cleveland, Mississippi, where he remained until 1946. Marguerite Zeigel's siblings were William (1904–2006), Elizabeth (1910–2003), and Howard (b. ca. 1920). Her sister, Elizabeth Zeigel Winter, was a professor and supervisor of student teachers at Delta State Teachers College.

Marguerite Zeigel received her elementary and secondary education in Kirksville, Missouri. She then attended Delta State Teachers College from 1925 until she received her bachelor's degree in education in 1928, the first year bachelor's degrees were awarded there. At Delta State she was a member of the college debating team and at graduation was ranked first in her class. The next three years she was a student at the University of Missouri. She was a Gregory scholar 1928–29 and received her master's degree in 1929. She was a Gregory fellow 1929–31.

Zeigel returned to Delta State as an assistant professor of mathematics and physics for the year 1931–32. She received her PhD from Missouri in 1932 after completing her dissertation in geometry with a minor in physics. She then took a position as assistant professor at a women's college, Lander College (now the coeducational Lander University), in Greenwood, South Carolina. The following year she was promoted to professor.

On August 7, 1936, at the end of her fourth year at Lander, Zeigel married Ernest Albert Hedberg (1903–1961). Ernest A. Hedberg was born in Huntington, Missouri, to Swedish parents. His father was a farmer and his mother a housewife. He received his BS from Northeast Missouri State Teachers College in 1928 and studied at Stanford University in 1928. He was a graduate student in mathematics at the University of Missouri during 1929–30, Marguerite Zeigel's second year there. He was an instructor at Wentworth Military Academy 1930–32 and received his PhD from Missouri in 1935. He was a professor at Alabama State Teachers College in Livingston 1935–36.

The year following their marriage, 1936–37, Ernest Hedberg was professor at Lander, and Marguerite Z. Hedberg was not on the faculty. The following year he was professor and acting head of the department at the University of South Dakota. In 1938 Ernest and Marguerite Hedberg were both hired at Baylor University in Waco, Texas. On her 1982 Smithsonian questionnaire Marguerite Hedberg described herself as a teacher in 1938–40 and Ernest Hedberg as an associate professor 1938–42.

During 1942–43 Marguerite Hedberg returned again to Delta State, this time as professor and acting head of the department. That year Ernest Hedberg was an instructor of mathematics, physics, and meteorology at the US Navy Preflight

School on the campus of the University of Georgia in Athens. During 1943–44 Marguerite Hedberg was an assistant professor at the University of Georgia while her husband was teaching in a US Army Specialized Training Program. In 1944 she worked as a civilian for the US Office of Scientific Research and Development while he was a technical writer in California for a National Defense Research Committee (NDRC) Project. Ernest Hedberg then served as an associate professor of electrical communications in the radar school at MIT 1944–46.

In 1946, after the war, they both were hired by the University of South Carolina in Columbia. Marguerite Hedberg was an adjunct professor 1946–49 and in 1949 became an associate professor; she retired as associate professor emeritus in 1976. Ernest Hedberg became a professor in 1950; he died in 1961.

Marguerite Hedberg was a member of the education honorary society, Pi Lambda Theta. She was a Presbyterian and in 1982 reported her hobbies as reading and listening to good music.

Hedberg was living in Columbia, South Carolina, at the time of her death in 2002 on her ninety-fifth birthday. She was survived by two brothers, a sister, and several nephews and nieces and was buried in Greenlawn Memorial Park in Columbia. After her death, Hedberg's estate left $1,000,000 for the establishment of the Wyman Loren Williams and Ernest Albert and Marguerite Zeigel Hedberg Chair of Mathematics at the University of South Carolina. Williams was the former head of the department who recruited the Hedbergs to the university.

Organizational affiliations: AMS, MAA, Sigma Xi, Sigma Delta Epsilon, Pi Mu Epsilon.

Dissertation:
1932 [Zeigel, M. L.] Some invariant properties of a two-dimensional surface in hyperspace. PhD dissertation, University of Missouri, directed by Louis Ingold. Typescript. Printed, 1933, by Edwards Brothers, Ann Arbor, MI.

Publication:
1928 [Zeigel, M.] A problem in projective geometry. *Math. News Lett.* 3 (2): 4–5.

Abstract:
1930 [Zeigel, M.] Principal directions for two dimensional surfaces in hyperspace. *Bull. Amer. Math. Soc.* 36:806–07 #426. Presented to a meeting of the AMS, Columbia, MO, 28–29 Nov 1930.

References to: AmMSc 8, 9P–11P; AmMWSc 12P–13P, 14–22; WhoAmW 8.
"Hedberg Exemplifies Tradition of Excellence." *Delta State Alumni News*, Spring 2002.
"Dr. Marguerite Hedberg." (Obituary) *Columbia* (*SC*) *State*, 28 Aug 2002.
"USC Receives $1 Million to Establish Mathematics Chair." *USC Times News & Headlines*, Apr 2003.
"Marguerite Zeigel Hedberg Establishes Endowed Chair in Mathematics." *Carolina's Future*, Spring 2003.

Other sources: PhD dissertation vita 1932; Smithsonian questionnaire 1982; Zeigel-Winter Collection, Delta State University Archives (Dr. William H. Zeigel); US Census 1910, 1920, MO, 1930 MS; SSDI.

Last modified: December 11, 2008.

HENNEL, Cora B. January 21, 1886–June 26, 1947.
Indiana University (BA 1907, MA 1908, PhD 1912).

Cora Barbara Hennel was born in Evansville, Indiana, the second of three daughters of Anna M. (Thuman) (1854–1925), born in Indiana, and Joseph Hennel (1842–1934), born in Ohio. Her parents married in 1882; it was a second marriage for her father. In early years he was a teacher, served for three years on the Union side in the Civil War, and later was in business. In 1900 three children (of five born) were living: Cecilia Barbara, born in 1883; Cora Barbara, born in 1886; and Edith Amelia, born in 1891. They lived on a farm near Evansville.

Cora Hennel and her older sister went to grade school together and both graduated from Evansville (now Central) High School in 1901. They then taught in country grade schools to save money for college and entered Indiana University in Bloomington together in the fall of 1903. The following year they convinced their parents and sister to move to Bloomington.

All three daughters received bachelor's and master's degrees from Indiana; Cora and Cecilia received BA's in 1907 and MA's in 1908 (Cora in mathematics and Cecilia in English), and Edith received a BA in 1911 and an MA in 1912 (both in botany) and stayed an additional year as a teaching fellow. Cora was a member of Mortar Board; all three were elected to Phi Beta Kappa. Both of Hennel's sisters were on the faculty at Indiana before their marriages; her older sister, Cecilia Hennel Hendricks, returned to the English department in 1931 after homesteading with her husband in Wyoming. She remained on the faculty until her retirement in 1953.

Cora Hennel continued her studies and began teaching at Indiana University immediately after receiving her bachelor's degree. She was a teaching fellow 1907–09, earned her master's degree in 1908, and was appointed instructor of mathematics in August 1909. At the suggestion of Professor David Rothrock, she continued her work toward the doctorate, and wrote her dissertation during the year 1911–12 under the direction of R. D. Carmichael. Carmichael received his PhD at Princeton as a student of G. D. Birkhoff in 1911 and was at Indiana briefly before he moved to the University of Illinois in 1915. Hennel's diaries in the Indiana University Archives describe her time as a student. Her entry of January 22, 1912, records, "Now as for this term ... the most remarkable thing is that I'm not teaching at all – just studying." On April 14 she wrote, "I'm simply cutting out everything this term and working ... thesis coming all right, but when I think of the cramming I'll have to do between now & June I feel desperate. Dr. C. has been very encouraging tho: he told me the other day my knowledge of math is as broad as that of half the men in the math faculty at Princeton. Gracious!" On June 9, after her examination, she wrote, "Well, it's over. And Dr. Carmichael said I passed a 'brilliant examination.'" Hennel's PhD in June 1912 was the first in mathematics and the first to a woman awarded by Indiana University. It was only the second doctorate in mathematics granted in the state of Indiana, the first having been awarded by Purdue to James Byrnie Shaw in 1897.

Hennel continued to hold a faculty position at Indiana until her death. She remained an instructor until 1916, was assistant professor 1916–23, associate professor 1923–36, and became professor in 1936. In about 1907 Hennel was instrumental in helping to start the Euclidean Circle, a mathematics club for mathematics majors, upperclassmen, graduate students, and faculty in the department. An article on

the Euclidean Circle in the winter 2006–07 department alumni newsletter notes the topics of some presentations Hennel made to the club. In 1925 she and a colleague, Harold T. Davis, produced notes that were used in a general mathematics course. The notes were not published, but were bound and distributed by the bookstore.

Hennel was extremely active on the campus, serving, for example, as president of the Indiana University chapters of AAUP, AAUW, the YWCA Board, the Corda Fratres Association of Cosmopolitan Clubs (dedicated to fostering understanding between foreign and American students), and the Women's Faculty Club. She was foreign student advisor, and, in 1920, was chairman of a committee on friendly relations among foreign students. She chaperoned student events, was a member of the university's student affairs committee, and was on the advisory board of the Association of Women Students. She regularly participated in local, state, and national meetings of mathematical and scientific organizations. She attended the organizational meeting of the MAA at Ohio State University in December 1915 and was vice chairman 1939–40 and chairman 1940–41 of the Indiana Section. She was also chairman of the mathematics division of the Indiana Academy of Science for 1940, and she and her sister attended the Harvard Tercentenary Conference of Arts and Sciences in Cambridge, Massachusetts in 1936.

The obituary in the *Proceedings of the Indiana Academy of Science* records that Hennel was "well known throughout the State, having addressed numerous Indiana University alumni groups, and various educational, professional and civic organizations" (p. 4). It notes further that "Dr. Hennel's chief contributions were in her excellent teaching and her influence on many students, both native and foreign.... In her quiet and unobtrusive way she encouraged and helped many of them not only through counseling but financially as well" (p. 4). In 1995 the Indiana mathematics department named its faculty/student lounge the Cora B. Hennel Room; the department also annually awards Cora B. Hennel memorial scholarships to outstanding undergraduate majors.

Hennel's main hobby was writing poetry, and some of her poems appeared in various publications including *The Columbia Anthology of Verse* and *School and Society*. She was affiliated with the First Methodist Church in Bloomington.

Cora Hennel had undergone major surgery several weeks before her death in Bloomington in 1947 at age sixty-one of colon cancer. She was survived by her two sisters, four nieces, and a nephew. She was cremated.

Organizational affiliations: AMS, MAA (charter member), AAUW, AAUP, Phi Beta Kappa, Sigma Xi.

Dissertation:

1912 Certain transformations and invariants connected with difference equations and other functional equations. PhD dissertation, Indiana University, directed by Robert Daniel Carmichael. Printed version, 1913, reprinted from *Amer. J. Math.* 35:431–52.

Publications:

1913a Transformations and invariants connected with linear homogeneous difference equations and other functional equations. *Amer. J. Math.* 35:431–52. Published version of PhD dissertation. Reviews: *JFM* 44.0395.02 (G. Wallenberg); *Rev. semestr. publ. math.* 22, pt. 1: 3 (E. B. Cowley). Presented to the AMS, Cleveland, OH, 1 Jan 1913; abstract: *Bull. Amer. Math. Soc.* 19:299 #44. Review of abstract: *JFM* 44.0395.02 (G. Wallenberg).

1913b Review of *A Brief Course in Analytic Geometry*, by J. H. Tanner and J. Allen. *Bull. Amer. Math. Soc.* 20:156–57.

1913c Review of *Elements of Plane and Spherical Trigonometry*, by J. G. Hun and C. R. MacInnes. *Bull. Amer. Math. Soc.* 20:99–100.
1913d Review of *Elements of Plane Trigonometry*, by D. A. Murray. *Bull. Amer. Math. Soc.* 20:156.

Abstract not listed above:
1941 And gladly teach. *Amer. Math. Monthly* 48:509 #1. Presented to the MAA, Indianapolis, IN, 3 May 1941.

References to: AmWom 1935–40, BiDWSci, BioWMath.
"Cora B. Hennel." (Obituary) 1947. *Proceedings of the Indiana Academy of Science* 57 (1947): 3–4.
Obituary. *Indianapolis Star*, 27 Jun 1947.
"Indiana University's First Mathematics Ph.D."

Related manuscript material:
Cecilia Hennel Hendricks Papers Box #16: All Cora B. Hennel Documents [includes diaries, scrapbooks, and other material]. Indiana University Archives.

Other sources: Owens questionnaire 1937; Indiana University Archives; Cecilia Hennel Hendricks, *Letters From Honeyhill: A Woman's View of Homesteading 1914–1922*, comp. and ed. Cecilia Hendricks Wahl (Boulder, CO: Pruett Publishing Co., 1986), 2nd ed. 1990; Gwenette Gaddis Goshert, "Roots – square and circular: The Euclidean Circle as the root of the Math Club," *Indiana University Department of Mathematics Alumni Newsletter* 12 (Winter 2006–07), 1-2; US Census 1880, 1900, 1910, 1920 IN; Indiana death certificate.

Last modified: January 15, 2016.

HENRIQUES, Anna (Stafford). August 20, 1905–November 28, 2004.
Western College for Women (BA 1926), University of Chicago (MS 1931, PhD 1933).

Anna Adelaide Stafford was born in Chicago, Illinois, the eldest of six children of Caroline (Fleuchaus) (ca. 1882–1919) and Richard W. Stafford (1881–1919). Her parents were born in Chicago, and both had a high school education; they married in 1904. At the time of the 1910 census they were living in Chicago, where her father was manager of a pickle factory. Later he managed lumber companies. Her brother, Richard W. (1907–1962), was born in St. Paul, Minnesota; her two sisters, Mabelle L. (1910–1977) and Marcia Frances (1912–1991), were born in Chicago; and her younger brother, Wirt W. (1914–1992), was born in Marshfield, Wisconsin. All were college graduates. Her youngest brother, Walter, died in infancy.

After her parents died in 1919, the five surviving Stafford children lived with her father's sister and her family, first in St. Louis, Missouri, and later in Chicago. Anna Stafford attended public schools in Chicago; Marshfield, Wisconsin; and Barnum, Minnesota, before graduating in 1922 from Frank Louis Soldan High School in St. Louis. She attended Western College for Women in Oxford, Ohio, with a four-year college scholarship and an AAUW scholarship from the St. Louis AAUW. While there, her majors were mathematics and Greek and her minor was French. She was in the classical club, the French club, and the mathematics club; she participated in theater; and she successfully participated in enough sports, baseball, hockey, basketball, and swimming, to earn a blue "W." In her college yearbook she is listed as from Evanston, Illinois.

Following her graduation from Western College in 1926, Stafford taught mathematics and science for two years at St. John Baptist School, an Episcopal school for girls in New York and later in Mendham, New Jersey. She taught at the Darlington Seminary in West Chester, Pennsylvania, 1928–29 and at St. John Baptist School in Mendham 1929–31. During the summers 1927–29, 1931, and 1933, she attended graduate school at the University of Chicago. From 1931 to 1933 she completed two years of residency at Chicago; she earned her master's degree in December 1931 and her PhD in August 1933 as a student of Mayme I. Logsdon. Her dissertation was in topology, a subject that had caught her attention upon hearing a lecture by Raymond Wilder of the University of Michigan. However, there were no topology specialists at Chicago, so she and Logsdon worked through the material together, learning Italian to do so.

From 1933 to 1935 Stafford was a member of the Institute for Advanced Study at Princeton, where she pursued her interest in topology. She was one of two women who went to the IAS in 1933; the other was Mabel Schmeiser (Barnes). In the same period, Stafford was on the faculty at St. John Baptist School, where she taught in the mornings, so she could attend lectures at the Institute in the afternoons. From 1935 to 1937 she was an instructor at the University of Nebraska. While there she published an article that ended with a bibliography of works that would aid teachers in making the mathematics curriculum more interesting; the list included Mayme Logsdon's *A Mathematician Explains* and Helen Merrill's *Mathematical Excursions*. In the summer following her first year of teaching, Stafford traveled in Europe, where she attended the International Congress of Mathematicians at Oslo

and visited England, Holland, Norway, Sweden, Denmark, Germany, Switzerland, and France.

In 1937 Stafford joined the faculty at the University of Utah in Salt Lake City where she remained for nearly twenty years. Also that fall Harriet Rees (Bonner), who had just earned her doctorate from Chicago, was appointed instructor at Utah and served for a year and a half. In 1942 Anna Stafford married Douglas E. Henriques, whom she had met in a church choir. He was born in Nevada in 1910 and was an administrative law judge for the US Department of the Interior. He had a twelve-year-old son by a previous marriage, Vico Emanuel, who became the president of the Computer and Business Equipment Manufacturers' Association (CBEMA). They later adopted a daughter, Virginia, a member of the Navajo Nation who was born in Bluff, Utah, and became a practical nurse.

At the University of Utah, Anna Stafford Henriques was instructor 1937–41, assistant professor 1941–47, and associate professor 1947–56. In 1946 she revived the mathematics club, which had become moribund some years earlier. She had a sabbatical leave during the spring quarter 1949 during which she taught one class while preparing a textbook for it. About the same time she wrote, but apparently never published, a paper entitled, "Some mathematical aspects of modern life." In a 1997 interview, Tom Apostol remarked that his "best mathematics teacher [at the University of Utah] was Anna Henriques" (Albers and Apostol, 258).

In 1956 Douglas Henriques's work took him from Utah to New Mexico, and so the family moved. In 1957 Anna Henriques became a lecturer at St. Michael's College (the College of Santa Fe since 1966). Two years later she also became a lecturer at the University of New Mexico and remained in both positions until 1962 when she became professor at St. Michael's. She retired in 1971 as professor emeritus. Shortly thereafter she and her husband were living in the Falls Church area of Fairfax County, Virginia, where they remained. Once retired, Douglas and Anna Henriques traveled, making trips to every continent.

Anna Henriques delivered several papers to professional organizations of which she was a member: the MAA, the NCTM, the Utah Council of Teachers of Mathematics (UCTM), and the Utah Academy of Sciences, Arts, and Letters. She held many positions in the Utah and New Mexico branches of AAUW and served as president, program director, and bulletin editor of the UCTM. She was also a member of Delta Kappa Gamma, a women's education honor society. She was involved with the Girl Scouts in 1955. During her lifetime her interests included mountain climbing, hiking, bowling, opera, theater, and travel. She was a generous contributor to the MAA and the IAS.

Douglas Henriques died in November 1987. Anna Henriques later moved to Goodwin House Bailey's Crossroads, a retirement community in the Falls Church area, and died there of congestive heart failure in 2004 at ninety-nine. She was survived by her step-son, Vico Henriques, two granddaughters, and five great-grandchildren.

Organizational affiliations: AMS, MAA, ASL, NCTM, AAAS, AAUW, Sigma Xi, Sigma Delta Epsilon, Pi Mu Epsilon.

Thesis and dissertation:

1931 [Stafford, A. A.] An application of the dihedral group. MS thesis, University of Chicago, directed by Mayme Irwin Logsdon. Typescript.

1933 [Stafford, A. A.] Knotted varieties. PhD dissertation, University of Chicago, directed by Mayme Irwin Logsdon. Typescript. Private edition, 1935, distributed by the University of Chicago Libraries.

Publications:
1937 [Stafford, A. A.] Adapting the curriculum to our era. *Sch. Sci. Math.* 37:400–415.
1948 The place of mathematics in general education. *Proc. Utah Acad. Sci., Arts and Ltrs.* 25:197.

Abstract not listed above:
1936 [Stafford, A. A.] The group of a knot. *Amer. Math. Monthly* 43:460 #5. Presented to the MAA, Lincoln, NE, 8 May 1936.

Presentations not listed above:
General mathematics goes to college. Presented to the NCTM, Los Angeles, 29 Dec 1953.
From the viewpoint of the mathematics education instructor. Presented to an NCTM group meeting on how to prepare teachers to teach general mathematics, Seattle, WA, 23 Aug 1954.
Language and logic. Presented to a meeting of the MAA, Santa Fe, NM, 12–13 Apr 1968.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P; BioWMath.
"Anna Stafford Henriques: A Member at the Institute in 1933." *Attributions: A Newsletter from the Development Office, Institute for Advanced Study*, Issue one, 2001.
Sullivan, Patricia. "Mathematics Pioneer Anna Henriques Dies." *Washington Post*, 2 Dec 2004.
"Anna Henriques." (Obituary) *Princeton Packet*, 10 Dec 2004.
"Anna Adelaide Stafford Henriques." (Obituary) *U-News & Views, University of Utah Alumni Association e-newsletter*, Jan 2005.
"Anna Adelaide Stafford Henriques." (Obituary) *University of Chicago Magazine*, Apr 2005.

Other sources: MS thesis vita 1931; PhD dissertation vita 1933; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1981; Miami University Archives; communications with University of Utah Archives and with Western College Alumnae Association; Donald J. Albers and Tom Apostol, "An interview with Tom Apostol," *College Math. J.* 28 (1997): 250–70; US Census 1900, 1910 IL, 1920 MO, 1930 IL.

Last modified: January 15, 2016.

HIGHTOWER, Ruby U. June 17, 1880–May 5, 1959.
Shorter Female College (BA 1896), University of Georgia (MA 1919), University of Missouri (PhD 1927).

Ruby Usher Hightower was born near Covington, Georgia, the youngest of four surviving daughters of Amarinth (Sims) (1844–1908) and James Richard Hightower (1846–1933), natives of Georgia. Her father was in the Confederate army during the Civil War; her parents married in 1869. Two children died as infants. The other daughters were Minnie (b. 1869), Alma (b. 1871), and Lillie Frances (b. 1874). In 1880 her father was a farmer, and in 1900 and 1910 he was described as a contractor.

Ruby Hightower attended high school in Jackson, Georgia, before completing work for her bachelor's degree in the academic year 1895–96 at Shorter Female College (Shorter College after 1923) in Rome, Georgia. In the twenty-three-year period between her graduation and the resumption of her teaching career at Shorter in 1919, she taught and studied at a number of places. She taught at: the grade school, at least in 1908–09, and high school in Dublin, Georgia; Central College (now closed) of Conway, Arkansas; Alabama Normal College (now the University of West Alabama); Cox College, a women's college in College Park, Georgia, (now closed) at least 1915–16; Anderson College (now University), then a women's college in South Carolina, 1916–17; and Southwest Baptist College and Hardin College in Missouri. She studied at the University of Chicago in 1899, at the University of London in 1913, and received her master's degree from the University of Georgia in 1919. She was the only one listed as receiving a Master of Arts degree at that June commencement at Georgia.

After receiving her master's degree, Hightower returned to Shorter and remained there, except for a leave of absence in 1924–25, until her retirement in 1947. The college annual of 1920 notes that she was elected fellow in mathematics at the University of Missouri for 1919–20. Apparently she delayed her entrance to the graduate school there until the summer of 1921. She was resident for five summer sessions and was granted a leave to study at Missouri 1924–25. She was an honorary fellow in mathematics for the year and then returned to Shorter as head of the department. She received her PhD with minors in physics and astronomy in 1927. While at Missouri she wrote her dissertation in ring theory under the direction of G. E. Wahlin. According to the Shorter College historian, Hightower was the first Shorter graduate to receive a PhD degree.

During Hightower's years at Shorter College she was generally the only permanent member of the mathematics department. Her interests included mathematical astronomy and economics. She wrote in 1940, "My chief interest is in teaching, and not in research, for which I have little available time" (Owens questionnaire). After her retirement in 1947, she spent time with relatives in Quitman and Atlanta, but maintained her apartment on the college campus. She taught part time at the college 1949–50, 1954–55, and 1956–57, and was emeritus after 1952.

Hightower was tall, slender, extremely soft-spoken, and, according to her obituary in the Shorter College alumni bulletin, "an excellent teacher, thoroughly grounded in her subject." She was a Baptist and a Democrat. She had been living at the college apartments in Rome until a few weeks before her death in Quitman, Georgia, in 1959. A niece in Quitman and a great-niece in Rome were among her survivors. The niece was a former dean of Shorter College.

Organizational affiliations: AMS, MAA (charter member), AAAS, Sigma Delta Epsilon, AAUW, AAUP, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1919 A study in conics. MA thesis, University of Georgia. Manuscript.
1927 On the classification of the elements of a ring. PhD dissertation, University of Missouri, directed by Gustav Eric Wahlin. Typescript. Printed abstract, 1927, Lancaster, PA.

Abstract:
1928 On the classification of the elements of a ring. *Bull. Amer. Math. Soc.* 34:701 #29. Based on PhD dissertation. Presented by title to the AMS, Amherst, MA, 6 Sep 1928.

References to: AmMSc 4–8, 9P; AmWom 1935–40, BiDWSci.
"Some New Members of the Faculty." *Shorter College* [*Alumnae*] *Bulletin*, July 1919.
"Dr. Ruby Hightower, Formerly of Rome, Dies in Quitman." *Rome* (*GA*) *News-Tribune*, 6 May 1959.
"Dr. Ruby Usher Hightower." (Obituary) *Shorter College Bulletin*, Oct 1959.

Other sources: PhD dissertation vita 1927; Owens questionnaires 1937, 1940; Center for Research Libraries College Catalog Collection; communications with Anderson University library director, Shorter College historian/archivist, and University of Georgia Archives; US Census 1880, 1900, 1910, 1920, 1930 GA.

Last modified: March 7, 2009.

HILL, Agnes (Baxter). March 18, 1870–March 9, 1917.
Dalhousie University (BA 1891, MA 1892), Cornell University (PhD 1895).

Agnes Sime Baxter was born in Halifax, Nova Scotia, Canada, the daughter of Janet (Methven) and Robert Baxter. Her parents were born in Scotland, her mother in 1845 and her father in 1844. She had two younger siblings, a sister, Elizabeth, and a brother, Norman, twins born in 1883. Her father was for many years manager of the gas works in Halifax.

Baxter graduated from Dalhousie University in Halifax in 1891, the first woman at Dalhousie to take first class honors in mathematics and mathematical physics; she also received the Sir William Young Gold Medal for her academic accomplishments. She remained at Dalhousie as a graduate student and received her master's degree in 1892. In 1937 her elder daughter wrote, "I always understood that mother was the first woman in Canada to take an M.A. in Math. I suppose – and I know that until a few years ago there was only one other woman who had won the Sir William Young Medal. Mother was too modest to ever tell us much of this" (Owens Papers).

Agnes Baxter entered Cornell University for graduate study in 1892. Her final year, 1894–95, she held an Erastus Brooks fellowship before receiving her PhD in 1895 with major subject pure mathematics, first minor mathematical physics, and second minor physics. The year after receiving her doctorate, she remained at Cornell editing the works of her advisor, James E. Oliver, who had died in March 1895.

On August 20, 1896, Agnes Baxter married Albert Ross Hill (1869–1943) in Halifax. A. Ross Hill, also from Nova Scotia, received a BA from Dalhousie in 1892, studied a year in Europe, and received a PhD from Cornell in 1895 with a dissertation in philosophy. At the time of their marriage A. Ross Hill was professor of psychology and education at the State Normal School in Oshkosh, Wisconsin. The following year he joined the philosophy faculty at the University of Nebraska. While they were in Lincoln, Nebraska, they had two daughters, Jessie Methven Hill, born December 13, 1897, and Ester Davison Hill, born March 19, 1903. In 1903 A. Ross Hill joined the educational psychology faculty at the University of Missouri as professor and dean of the school of education. He spent 1907–08 as professor, director of the school of education, and dean of the college of arts and sciences at Cornell before returning the following year to Missouri as president of the University of Missouri.

Agnes Hill died in 1917, shortly before her forty-seventh birthday, in Columbia, Missouri, of pneumonia following influenza and operations during a lengthy illness. Funeral services were held in the Columbia Presbyterian Church; she was buried in the Columbia cemetery. After her death, A. Ross Hill presented Dalhousie with a gift of books "to perpetuate the memory of one of its loyal graduates, who gave her life to assist in [his own] educational work instead of making an independent record for herself" (Wilkins and Dilcher 1988). On March 15, 1988, the Agnes Baxter Reading Room, the library for the Department of Mathematics, Statistics, and Computing Science at Dalhousie, was officially opened and dedicated.

Organizational affiliations: AAUW, Phi Beta Kappa, Sigma Xi, Pi Lambda Theta.

Dissertation:
1895 [Baxter, A. S.] On Abelian integrals: A resume of Neumann's "Abelsche Integrale," with comments and applications. PhD dissertation, Cornell University, directed by James Edward Oliver.

References to: BioWMath, DcCanB 14, MacTutor, NotMat, NotSci 2, NotTwCS 1S.
"Hill–Baxter: A. Ross Hill and Agnes Sime Baxter of Halifax Married." *Oshkosh* (*WI*) *Daily Northwestern*, 26 Aug 1896.
"Mrs. A. Ross Hill Dies Today." Unidentified Columbia (MO) newspaper, 9 Mar 1917.
"Mrs. A. Ross Hill Dead." *Missouri Alumnus* 5 (15 Mar 1917): 187–88.
"Baxter, Agnes Sime: In Memoriam." *Dalhousie Gazette*, 15 Jun 1917.
Wilkins, Gina and Karl Dilcher. "Dalhousie University Honours Alumna with Room Dedication." (Press Release) 11 Mar 1988.

Other sources: Owens questionnaire 1937 (completed by daughter?); Owens Papers; Williams Papers; correspondence with Karl Dilcher, Department of Mathematics and Statistics, Dalhousie University; Division of Rare and Manuscript Collections, Cornell University Library; DcAmB 32 (Hill, A. Ross); Canadian Census 1881, 1901 (Nova Scotia); US Census 1900 NE, 1910 MO; Missouri death certificate.

Last modified: January 16, 2016.

HILL, Sister Mary Laetitia. December 22, 1898–April 10, 1992.
Our Lady of the Lake College (BA 1922), Catholic University of America (Catholic Sisters College) (MA 1926), Catholic University of America (PhD 1935).

Maria Anna Hill was born in Koerth, Texas, the first of two surviving daughters of Mary Bradley (Watson) (1866–1922), born in Georgia, and Thomas James Hill (1863–1936), from Texas. Her father had been married previously and had three sons with his first wife. At that time, he was in the livestock business. After his first wife died in 1891, he attended medical school in Louisville, Kentucky, settled in Seguin, Texas, and in 1893 moved to Koerth and married Mary Bradley Watson. He practiced medicine and continued in the stock business. Their other surviving daughter, Catherine Jane, was born in 1905. In 1912 the family moved to Yoakum, Texas, where Thomas Hill practiced medicine. His second wife died in 1922, and he remarried in 1923.

Maria Hill started her schooling at age four in a public school before attending, after one year, the Sacred Heart School in Hallettsville, near Koerth, and in 1913–14 the St. Joseph School in Yoakum, where she was taught by the Sisters of Divine Providence. She entered the convent of the Congregation of Divine Providence (CDP) in San Antonio in 1914, at age fifteen, and made her first profession in 1916.

During the years 1916–22, Sister Mary Laetitia Hill taught and completed the work for her bachelor's degree. She first taught at St. Mary's School in San Antonio; while there she taught high school, fifth grade, and kindergarten in the years 1916–21; in second semester 1920–21, she taught in Our Lady of the Lake high school. She taught at the Holy Family School in Tulsa, Oklahoma, from 1921 to 1925. In the meantime, she received her bachelor's degree in 1922 from Our Lady of the Lake College (now Our Lady of the Lake University of San Antonio). In 1925–26, she studied at the Catholic University of American and received her master's degree in 1926.

Sister Mary Laetitia Hill taught at Our Lady of the Lake College, established by the Sisters of Divine Providence, for forty-one years: as instructor 1926–32 and as professor 1935–70. The first six years she taught both mathematics and physics. In 1932–35 she was at Catholic University studying for her doctorate in mathematics. While there she wrote her dissertation in algebraic geometry and received her PhD in 1935 with first minor physics and second minor mechanical engineering. Starting around the time she received her doctorate, Sister Mary Laetitia joined several professional organizations: the AMS in 1935, the American Association of Physics Teachers in 1936, and the American Physical Society in 1937. She also became a member of the Texas Academy of Science and later joined the MAA and NCTM.

For nearly twenty-five years, starting in summer 1935, Sister Laetitia taught mathematics or physics or both during the school year and in most summer sessions. In addition to her teaching at Our Lady of the Lake College, she also directed an NSF-sponsored summer institute for high school teachers at the college for six weeks in 1959. She then received an NSF grant to participate for eight weeks in 1962 in a summer institute for college teachers of mathematics at Bowdoin College in Maine.

After Sister Laetitia retired from Our Lady of the Lake College in 1969, she worked in the college accounting office as a keypuncher until 1972. In 1972 she retired to the convent and Regan Hall for retired sisters. In July 1974 she came out

of retirement to go to the Congregation of Divine Providence house in Queretaro, Mexico, for one semester before returning to San Antonio. In August 1975 she joined the CDP community in Tuba City, Arizona, and remained for three years.

Sister Laetitia was a serious bird watcher, who was known to abandon class briefly, telescope in hand, if she spotted a particularly interesting bird out the window. She taught herself Spanish; shorthand; and to play the organ, flute, and violin; and was reported to have memorized all of Shakespeare's sonnets.

Sister Laetitia finally retired in 1979. She died at age ninety-three in McCullough Hall, the intensive care nursing facility of Our Lady of the Lake Convent in San Antonio, in 1992. She was buried in Providence Cemetery at the convent.

Organizational affiliations: AMS, MAA, NCTM, Amer. Assoc. of Phys. Teachers, Amer. Phys. Soc.

Thesis and dissertation:
1926 The Wallace lines of a triangle. MA thesis. Catholic Sisters College of the Catholic University of America. Typescript.
1935 The number and reality of quadrilaterals in-and-circumscribed to a rational unicuspidal quartic with real tangents from the cusp. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC, by J. H. Furst Co., Baltimore, MD. Review: *JFM* 61.0694.03 (M. Steck).

References to: AmMSc 7, 10P–11P.
"Sr. Laetitia Hill." (Brief Autobiography) *CDP Times*, Jan 1982.
"Sister Mary Laetitia Hill, CDP." (Obituary) *Today's Catholic* (*San Antonio*), 15 May 1992.
Gallatin, Sr. Margaret Ellen. "Sr. Laetitia Hill Wanted to Go Where 'Mama and Papa Are'." (Obituary) *CDP Times*, May 1992.

Other sources: Owens questionnaire 1937; communications with Sister Martha Anne Hunter (relative), with Congregation of Divine Province Archives (San Antonio), and with Our Lady of the Lake University development office; US Census 1900, 1910, 1920, 1930 TX.

Last modified: February 7, 2009.

HIRSCHFELDER, Elizabeth (Stafford). April 25, 1902–September 29, 2002. Brown University (Women's College) (PhB 1923, MS 1924), University of Wisconsin (PhD 1930).

Elizabeth Thatcher Stafford, the eldest of three children, was born in Providence, Rhode Island, to Evangeline K. (Flagg) (1877–1966) and Arthur Ervin Stafford (b. 1875), a banker. Her mother was a direct descendent of Roger Williams, the founder of Rhode Island. Her parents, both natives of Rhode Island, married in 1899, and she had two younger brothers, Stuart W. (b. 1904) and Harvey Chace (b. 1906). Harvey graduated from Brown University in 1927 and became an accountant in Manhattan.

Stafford's family lived very close to Brown University. Because of financial difficulties in 1918, she was only able to attend college by living at home. She attended Women's College of Brown, graduated in 1923, and remained at the university an additional year in order to earn her master's degree. In a 1995 interview for the Oral History Program at the University of Wisconsin, she mentioned both R. G. D. Richardson and R. C. Archibald when asked if there were any faculty at Brown who had influenced her. She noted that Archibald's influence extended beyond mathematics to his second interest, music, as he bought seats for students at Boston Symphony Orchestra concerts held in Providence. She also remarked that there were two other women in her class at Brown and all three got teaching jobs in colleges when they graduated; Ellen Clayton Stokes and Evelyn Wiggin (Casner) also received master's degrees from Brown in 1924. Elizabeth Stafford took a position as a last-minute replacement for a faculty member at the University of Texas. Letters of recommendation from Richardson reflect his high opinion of her. In one he noted that she was well-trained, well-balanced and cultured and that she would be a great success there. She spent the year 1924–25 as an instructor in pure mathematics (for $1800) at the University of Texas in Austin. In December 1924 Richardson notes in a letter to her that it is very ambitious if she takes a course for credit.

Since no position was available for Stafford at the University of Texas the following year, she applied for a job at Texas Technological College (now Texas Tech University) in Lubbock, which was scheduled to offer its first instruction at the postsecondary level in September 1925. She was hired as an adjunct professor and remained until 1928.

During the summer of 1927, Stafford attended summer school at Brown and took a graduate course from Mark H. Ingraham. Ingraham, who had received his PhD at Chicago in 1924 under E. H. Moore, left Brown for the University of Wisconsin in 1927 and urged Stafford to apply there for a fellowship so she could do graduate work with him. She took a leave from her position at Texas Technological College, studied at the University of Chicago in the summer of 1928, and entered the University of Wisconsin with a fellowship in mathematics that fall. In October 1929, she and seven men were admitted to candidacy for the PhD. She held a fellowship again in 1929–30, and in 1930 she received her degree in linear algebra as Ingraham's first doctoral student at Wisconsin.

While Stafford was in Texas she had worked with H. S. Vandiver on computations to check Fermat's Last Theorem. In 1929, Vandiver, who had come to the University of Texas in 1925, published a paper in the *Transactions* of the AMS in which he acknowledged Stafford's assistance with the computations. The following year,

while Stafford was at the University of Wisconsin, they coauthored a paper on the subject that appeared in the *Proceedings of the National Academy of Sciences*. Vandiver continued to publish papers on Fermat's Last Theorem and continued to acknowledge Stafford's contributions.

Stafford reported later that while she was at Wisconsin she "had fallen in love with this man who worked in the mathematics department" (Teicher interview 1995). She returned to Lubbock for the year 1930–31 and then went back to Madison, where on June 6, 1931, she was married to Ivan S. Sokolnikoff (1901–1976) of Russia. Ivan Sokolnikoff immigrated to the United States in 1921, did his undergraduate work at the University of Idaho, and received his PhD from Wisconsin in 1931. After a honeymoon trip to Manchuria to visit his parents that summer, both returned to the mathematics department at Wisconsin. He progressed from instructor to professor until he left in 1946 to finish his career at the University of California at Los Angeles.

Elizabeth Sokolnikoff first served as instructor at Wisconsin 1931–32 and then continued in a number of irregular positions. Correspondence in the archives at Wisconsin reveals circumstances of her initial appointment and of some appointments subsequent to it. On September 15, 1931, Warren Weaver, then the department chair, wrote to Dean Sellery, the dean of the college, noting that the department wanted to recommend the temporary appointment of Mrs. Sokolnikoff since an instructor had left. He wrote, "We could not hope to get a person of Mrs. Sokolnikoff's training and ability for the salary involved ($1800) except under very unusual circumstances." In a letter of February 8, 1932, Mark Ingraham, the new chairman, wrote to the dean regarding proposed budget cuts: "Mrs. Sokolnikoff has taught full time at a salary of $1800. Mrs. Sokolnikoff took her degree here a few years ago and is both from mathematical ability and teaching ability a person of very superior quality–one who could well rank as an assistant professor in any university. If we make the cut contemplated above, it would seem almost necessary to drop her from the pay roll or retain her only for part time. I feel in general it is not well to tie ourselves up with husbands and wives on the pay roll, but it is with great reluctance that I would make this change during the year when we have lost Professor Weaver." On May 19, 1932, another letter from Ingraham to the dean followed regarding the Sokolnikoffs.

> There is no reason in justice why he [I. S. Sokolnikoff] should not be getting as much as the other assistant professors in the Department. Moreover, although Mrs. Sokolnikoff is one of our best instructors and is better prepared than any other instructor to give advanced work, we have omitted her from the tentative budget for next year due to the fact that you do not feel it wise to retain the wife of a member of the Department on the staff. Although you may feel that this action is both necessary and wise, you can readily understand how it would be discouraging to the Sokolnikoffs in light of the fact that they must know that there are a number of other couples engaged in teaching at the University of Wisconsin. (folder Budget 1931–33, box 1: 1924–1937, Budget Files, Department of Mathematics, College of Letters and Science, University of Wisconsin–Madison Archives)

After a year as instructor and a year without a position, Elizabeth Sokolnikoff was hired primarily as a lecturer on an ad hoc basis for the next several years.

During World War II, Elizabeth Sokolnikoff, like Grace Hopper, wanted to join the US Navy WAVES (Women Accepted for Volunteer Emergency Service) but was told that she should teach mathematics instead. During the war, I. S. Sokolnikoff spent much of his time in New York and Washington working with the National Defense Research Council. Elizabeth Sokolnikoff spent the war years in Madison teaching calculus and differential equations to army and navy groups, geologists, and engineers. In her 1995 interview, she said that "we were separated a lot during those war years. . . . I was very much in favor of [Ivan's going to California] and very much in favor of my not going to California with him." Before their separation, the Sokolnikoffs had a fruitful mathematical relationship; in the period 1934 to 1941 they coauthored five significant mathematical papers in analysis and the classic text *Higher Mathematics for Engineers and Physicists*. They were divorced in 1947, the year after I. S. Sokolnikoff went to UCLA. In 1947 Elizabeth Sokolnikoff was given a three-year appointment as assistant professor. In 1952 she was an invited speaker at a symposium on the mathematical training of engineers held at the summer mathematics meetings in East Lansing, Michigan. The symposium was described in an article in the *Monthly* the following year.

On March 7, 1953, Elizabeth S. Sokolnikoff married Joseph Oakland Hirschfelder (1911–1990), a professor of chemistry at Wisconsin. She took a leave of absence for the year 1953–54. Joseph Hirschfelder was a native of Baltimore who had done his undergraduate work at Yale and received a PhD from Princeton in physics and chemistry in 1936. He joined the chemistry department at Wisconsin in 1937 and remained until his retirement in 1981 except for military research during World War II. Between 1942 and 1946, he was with the National Defense Research Committee (NRDC) in Washington, D.C., was a group leader at Los Alamos working on the development of the atomic bomb, and was at a naval ordinance test station in California. Some years after his return to Madison, he was the founder of UW-Madison's Theoretical Chemistry Institute. He was elected to the National Academy of Sciences in 1953 and was awarded the National Medal of Science in 1976. After their marriage, Elizabeth Hirschfelder spent the summer proofreading a lengthy, and later, classic text that her husband coauthored. Joseph O. Hirschfelder also acknowledged the help of his wife in papers he published in the mid-1950s. He retired from Wisconsin in 1981.

In 1954 Elizabeth "Betty" Hirschfelder resigned her position as assistant professor of mathematics in order to be able to accompany Joseph "Joe" Hirschfelder when he traveled to give lectures. In 1957 they took a trip around the world. In the mid-1970s they began to split their time between Madison, Wisconsin, and Santa Barbara, California, where Joe Hirschfelder was an adjunct professor at the university. Joseph Hirschfelder died of cancer in their home in Madison in 1990.

In 1992 the Broida-Hirschfelder Graduate Fellowship in the Sciences was first awarded to doctoral students in the fields of engineering, science, and mathematics at the University of California at Santa Barbara. The fellowship, which was partially endowed by Betty Hirschfelder, continues to be awarded by the UCSB Shoreliners (formerly the UCSB Faculty Womens Club) with matching support from the UCSB Graduate Division.

At the University of Wisconsin, Betty Hirschfelder helped establish the Joseph O. Hirschfelder Prize in Theoretical Chemistry in 1991 in honor of her late husband and was a leading donor for an addition to the chemistry building for which ground was broken in September 1999. She also provided funds that led to the 1997 establishment of the University of Wisconsin Foundation's Elizabeth S. Hirschfelder Fund for Graduate Women in Mathematics, Chemistry, and Physics.

Elizabeth S. Hirschfelder spent her winters in Santa Barbara and died at age one hundred in September 2002 in Madison, Wisconsin. She left significant bequests to the Broida-Hirschfelder Endowment at UCSB and to the University of Wisconsin. She was survived by two nieces, Pamela Godillot of Collegeville, Pennyslvania, and Dianna Cheseldine of Chicago, Illinois.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Dissertation:

1930 [Stafford, E. T.] Matrices conjugate to a given matrix with respect to its minimum equation. PhD dissertation, University of Wisconsin, directed by Mark Hoyt Ingraham. Printed version, 1933, reprinted from *Amer. J. Math.* 55:167–80.

Publications:

1930 [Stafford, E. T.] with H. S. Vandiver. Determination of some properly irregular cyclotomic fields. *Proc. Nat. Acad. Sci. USA* 16:139–50. Review: *JFM* 56.0887.04 (T. Rella). Presented to the AMS, New York City, 27 Dec 1928; abstract: *Bull. Amer. Math. Soc.* 35:181 #65.

1933 [Sokolnikoff, E. S.] Matrices conjugate to a given matrix with respect to its minimum equation. *Amer. J. Math.* 55:167–80. Published version of PhD dissertation. Reviews: *JFM* 59.0902.07 (W. Specht); *Zbl* 006.38707 (C. C. MacDuffee). Presented as "On matrices conjugate with respect to the minimum equation" to the AMS, Chicago, 19 Apr 1930; abstract: *Bull. Amer. Math. Soc.* 36:362 #269.

1934a [Sokolnikoff, E. S.] with I. S. Sokolnikoff. *Higher Mathematics for Engineers and Physicists.* New York: McGraw-Hill Book Co. Reviews: *Amer. Math. Monthly* 41:625–27 (H. M. Gehman); *Math. Gaz.* 18:282–83 (W. G. Bickley); *Natl. Math. Mag.* 9:182–83 (Wm. E. Byrne); *Nature*, 135 (suppl. 9 Mar 1935): 386. Second ed.: 1941. New York: McGraw-Hill Book Co. Review of 2nd ed.: *Amer. Math. Monthly* 49:255–56 (H. M. Gehman). Translation of 2nd ed. into Spanish by J. C. Vignaiux: 1959. *Matematica superior para ingenieros y fisicos.* Buenos Aires, Argentina: Nigar.

1934b [Sokolnikoff, E. S.] with I. S. Sokolnikoff. Note on a resolution of linear differential systems. *Proc. Edinburgh Math. Soc.* 2nd ser., 4:36–40. Reviews: *JFM* 60.0395.01 (M. Müller); *Zbl* 009.01801 (E. Whittaker). Presented by title as "On a resolution of linear differential systems" to the AMS, Chicago, 14 Apr 1933; abstract: *Bull. Amer. Math. Soc.* 39:342 #127. Also presented to the Edinburgh Math. Soc., 4 Nov 1933.

1935a [Sokolnikoff, E. S.] with I. S. Sokolnikoff. The problem of Dirichlet for an ellipsoid. *Proc. Nat. Acad. Sci. USA* 21:617–18. Reviews: *JFM* 61.0533.02 (G. Tautz); *Zbl* 013.11302 (J. J. Gergen). Presented as "A Dirichlet problem for an ellipsoid lying between two infinite planes" to the AMS, Chicago, 19 Apr 1935; abstract: *Bull. Amer. Math. Soc.* 41:199 #167.

1935b [Sokolnikoff, E. S.] With I. S. Sokolnikoff. The problem of Dirichlet for an ellipsoid. *Terrestr. Mag. Atmosh. Electr.* 40:433–42. Review: *Zbl* 013.26702 (J. J. Gergen).

1938 [E. S. Sokolnikoff] with I. S. Sokolnikoff. Torsion of regions bounded by circular arcs. *Bull. Amer. Math. Soc.* 44:384–87. Review: *JFM* 64.0836.04 (G. Schulz). Presented by title to the AMS, Indianapolis, IN, 30 Dec 1937; abstract: *Bull. Amer. Math. Soc.* 44 (1, pt. 1): 45–46 #64.

1939 [Sokolnikoff, E. S.] with I. S. Sokolnikoff. Thermal stresses in elastic plates. *Trans. Amer. Math. Soc.* 45:235–55. Reviews: *JFM* 65.0946.02 (K. Marguerre); *Zbl* 020.26304 (P.

Funk). Presented by I. S. Sokolnikoff to the AMS, Chicago, 8 Apr 1938; abstract: *Bull. Amer. Math. Soc.* 44:351 #266.
1948 [Sokolnikoff, E. S.] Review of *Plane Trigonometry*, by E. B. Mode. *Amer. Math. Monthly* 55:176.

Abstracts not listed above:
1931 [Stafford, E. T.] A general Vandermodian determinant. *Amer. Math. Monthly* 38:367 #3. Presented to the MAA, Fort Worth, TX, 31 Jan 1931.
1952 [Sokolnikoff, E. S.] The student talks back. *Amer. Math. Monthly* 59:591 #4. Presented to the MAA, Milwaukee, WI, 10 May 1952.

Presentation not listed above:
Problems of mathematicians who teach engineers. Presented to the MAA, East Lansing, MI, 2 Sep 1952.

References to: AmMSc 5–8, 9P; AmWom 1935–40.
"The Elizabeth 'Betty' Hirschfelder Birthday Celebration," *Van Vleck Notes*, Fall 1997, 14.
Moe, Doug. "At 100, She's Still Sparkling." *Madison Capital Times*, 29 Apr 2002.
"Hirschfelder, Elizabeth S." (Obituary) *Santa Barbara (CA) News-Press*, 1 Oct 2002.
"In Memoriam." *Badger chemist: the newsletter of the University of Wisconsin-Madison Chemistry Department* 46 (2002) pp 30ff. Obituary of Elizabeth Stafford Hirschfelder from *The Capital Times*, 1 Oct 2002.
Death Notices. *Van Vleck Notes*, 2003.

Unpublished interview:
Hirschfelder, Elizabeth 1902–2002. Interview by Barry Teicher, 16 Oct 1995. Oral History Program, University of Wisconsin-Madison Archives. Permanent link.

Other sources: Owens questionnaire 1940; Brown University Archives; University of Wisconsin–Madison Archives; Ralph Hull, "The mathematical training of engineers," *Amer. Math. Monthly* 60 (1953): 106–08; University of California: In Memoriam, [1979], 109–11 (Sokolnikoff, Ivan Stephan); "J. O. Hirschfelder, 78, Atom Bomb Developer," *New York Times*, 31 Mar 1990; "Joseph Hirschfelder, 78, Dies; Helped Develop Atomic Bomb," *Washington Post*, 1 Apr 1990; R. Byron Bird, Charles F. Curtiss, and Phillip R. Certain, "Joseph Oakland Hirschfelder," *Biographical Memoirs*, National Academy of Sciences; US Census 1900, 1910, 1920, 1930 RI, 1930 WI; SSDI.

Last modified: January 27, 2016.

HOPKINS, Margarete C. (Wolf). November 3, 1911–April 3, 1998.
University of Wisconsin (BS 1932, MA 1933, PhD 1935).

Margarete Caroline Wolf was born in Milwaukee, Wisconsin, the second of two daughters of Caroline (Kupperian) (1875–1973) and John Theodore Wolf (1872–1953). Her mother, who was born in Germany and immigrated to the United States in 1892, and her father, born in Milwaukee, were married in January 1898. Both were formally educated through elementary school. In the 1900 census her father's occupation was listed as conductor on the street railroad; later he was a truck gardener. Margarete Wolf's older sister, Louise A. Wolf, was born in Milwaukee in October 1898 and also received a PhD in mathematics from Wisconsin in 1935.

After attending the Jefferson School, a grade school in Greenfield, Wisconsin, and Bayview High School in Milwaukee 1924–28, Margarete Wolf entered the Milwaukee Extension Division of the University of Wisconsin for the year 1928–29 before going to Madison for the remainder of her undergraduate and graduate work. She held a Fanny P. Lewis scholarship 1930–32 and was president of the mathematics club her senior year. In February of her senior year at Wisconsin, she was recommended for a scholarship for the following year. Mark Ingraham, the acting chair, wrote,

> She has now been at the University for five semesters and in all her courses has received an "A" – this in spite of the fact that she has uniformly elected as hard a program as she could; has at times taken correspondence courses during vacations for the fun of it; has entered classes where she was warned that she did not have the prerequisite and then proceeded to lead the class; and during this last semester has taken Mathematics 220 and 265 (The Theory of Analytic Functions and Harmonic Analysis), two of our standard and difficult graduate courses, and has received "A's" in both of these courses. (Ingraham to Dean Slichter, February 25, 1932, folder Budget 1931–33, box 1: 1924–1937, Budget Files, Department of Mathematics, College of Letters and Science, University of Wisconsin–Madison Archives)

Margarete Wolf held scholarships 1932–34 and was a research assistant 1934–35 before receiving her PhD in 1935 as a student of Mark H. Ingraham. Margarete's sister, Louise, thirteen years her senior, also earned her doctorate in 1935 with Ingraham serving as her advisor. In a conversation with one of the authors in 1997, Margarete said that they got their interest in mathematics and in education from their mother.

Ingraham, the department chairman, wrote to E. J. Moulton at Northwestern on August 8, 1935, "By the way, we have just gone through the examinations and completed signing the theses of the two Wolf sisters – Margarete and Louise. They are among the best women doctors I have known. If you know of any positions for corking good people, both mathematicians and teachers, who are at the same time women, please give me a tip" (folder 1933–35, box 1: Personal Correspondence, Correspondence and Manuscripts 1927–1935, Mark H. Ingraham, General Files, College of Letters and Science, University of Wisconsin-Madison Archives). Louise immediately took a position at the University of Wisconsin's Milwaukee Extension Center (now University of Wisconsin-Milwaukee), where she remained until her retirement shortly before her death in 1962. Margarete continued at Wisconsin as

research assistant 1935–36, part-time instructor 1936–38, and also research associate 1937–38. After receiving her doctorate, Margarete Wolf continued to work with Mark Ingraham and published four papers, including her dissertation and two joint with Ingraham, by 1938. She was supported on grants for the work on three of these papers; work on her 1937 paper was supported by the Graduate School at Wisconsin and work on both of her 1938 papers was supported by the Wisconsin Alumni Research Foundation. In addition to publishing papers with Ingraham, while on her research assistantship she helped in the preparation of a paper by him alone that appeared in the February 1938 issue of the *Bulletin* of the AMS. She also gave several talks, including two joint with Ingraham and one joint with her sister. Results from Margarete Wolf's dissertation, published in 1936 in the *Duke Mathematics Journal*, were generalized thirty years later and continued to be referenced into the early 2000s.

In 1938 Margarete Wolf moved to Wayne University (now Wayne State University) in Detroit, where she was an instructor until 1941. On August 31, 1941, she married Edward John Hopkins, who was born in 1908 in New York City. He received his BS in electrical engineering from Wisconsin, worked for RCA 1936–37, and spent the rest of his career, 1938–71, working as an electronics engineer with the US Navy in Brooklyn, where they made their home.

Although it does not appear that Margarete Wolf Hopkins had a regular job when she went to New York, she taught in the evening and extension sessions of Hunter College during the 1942–43 and 1943–44 academic years. Her first child, Edward John, was born on February 14, 1945, in New York. Her daughter, Margaret Louise, was born on January 19, 1949, also in New York. Edward earned a bachelor's degree in chemistry, a master's degree in science education, and a doctorate from the University of Wisconsin in meteorology. Margaret did all of her work at Wisconsin; she received a bachelor's degree in physics, a master's degree in meteorology, and had several years of doctoral research.

Margarete Hopkins returned to her mathematics career in 1958, when she joined the faculty at St. Joseph's College for Women in Brooklyn. She related in 1997 that when she stopped by to donate some periodicals they convinced her to teach part time and then full time. She was assistant professor 1958–64, associate professor 1965–68, and professor and chairman of the mathematics department 1969–78. In 1970 the college changed its name to St. Joseph's College, New York; it became coeducational in 1971.

Edward Hopkins, Margarete's husband, died in October 1985. Margarete Hopkins later moved to Madison and lived with her daughter's family. She and Elizabeth Hirschfelder attended the UW-Madison Mathematics PhD Centennial Conference held in Madison in May 1997; they were then eighty-five and ninety-five, respectively. Margarete Wolf Hopkins died the following April.

Organizational affiliations: AMS, MAA, NCTM, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi.

Dissertation:

1935 [Wolf, M. C.] Symmetric functions of matrices, PhD dissertation, University of Wisconsin, directed by Mark Hoyt Ingraham. Summary: *Summaries of Doctoral Dissertations, University of Wisconsin* 1:129. See also **1936**.

Publications:
1936 [Wolf, M. C.] Symmetric functions of non-commutative elements. *Duke Math. J.* 2:626–37. Published version of PhD dissertation. Reviews: *JFM* 62.1103.01 (R. Kochendörffer); *Zbl* 016.00501 (N. Jacobson). Presented as "Symmetric functions of matrices" to the AMS, Ann Arbor, MI, 10 Sep 1935; abstract: *Bull. Amer. Math. Soc.* 41:486 #274.
1937 [Wolf, M. C.] with M. H. Ingraham. Relative linear sets and similarity of matrices whose elements belong to a division algebra. *Trans. Amer. Math. Soc.* 42:16–31. Reviews: *JFM* 63.0087.04 (O. Teichmüller); *Zbl* 017.09902 (J. L. Dorroh). Presented as "Characteristic spaces associated with the matrix whose elements belong to a division algebra" by M. H. Ingraham to the AMS, Ann Arbor, MI, 13 Sep 1935; abstract by M. H. Ingraham: *Bull. Amer. Math. Soc.* 41:622 #301. Also presented by M. H. Ingraham to the AMS, Cambridge, MA, 3 Sep 1936; abstract: *Bull. Amer. Math. Soc.* 42 (7, pt. 1): 493 #295.
1938a [Wolf, M. C.] Transformation of bases for relative linear sets. *Bull. Amer. Math. Soc.* 44:716–18. Reviews: *JFM* 64.0943.01 (R. Kochendörffer); *Zbl* 021.00403 (W. Franz). Presented as "The transformation of bases of relative linear sets" to the AMS, Indianapolis, IN, 29 Dec 1937; abstract: *Bull. Amer. Math. Soc.* 44 (1, pt. 1): 50 #80.
1938b [Wolf, M. C.] with M. H. Ingraham. Convergence of a sequence of linear transformations. *Amer. J. Math.* 60:107–19. Reviews: *JFM* 64.0166.01 (H. Raff); *Zbl* 018.09801 (H. Ulm). Presented by M. C. Wolf to the AMS, Chicago, 9 Apr 1937; abstract: *Bull. Amer. Math. Soc.* 43:187 #172.

Abstracts not listed above:
1938 [Wolf, M. C.] with L. A. Wolf. The linear equation in matrices with elements in a division algebra. *Bull. Amer. Math. Soc.* 44 (9 pt. 1): 639 #384. Presented by M. C. Wolf to the AMS, New York City, 6 Sep 1938.
1939 [Wolf, M. C.] Transformations of bases for relative sets over a non-commutative field. *Bull. Amer. Math. Soc.* 45:686 #394. Presented to the AMS, Madison, WI, 8 Sep 1939.

References to: AmMSc 6, WhoAmW 8–9.

Other sources: PhD dissertation vita 1935; Owens questionnaire 1940; Smithsonian questionnaire 1982; conversation with author, 23 May 1997; University of Wisconsin–Madison Archives; US Census 1900, 1920 WI.

Last modified: June 23, 2011.

HOPPER, Grace (Murray). December 9, 1906–January 1, 1992.
Vassar College (BA 1928), Yale University (MA 1930, PhD 1934).

Grace Brewster Murray was the daughter of Mary Campbell (Van Horne) (1883–1960) and Walter Fletcher Murray (1873–1947). Her parents were both born in New Jersey and married in 1903. Her mother had attended a private girls' school in New York, and her father graduated from Yale University in 1894 and became an insurance broker. She had two younger siblings, Mary (b. 1909) and Roger Franklin II (1911–1998); all the children were born in New York City. Her maternal grandfather, John Van Horne, was a civil engineer for the City of New York, and she accompanied him on surveying trips as had her mother when she was young. Her paternal grandfather had emigrated from Scotland to New York City when he was eleven years old.

Grace Murray attended the Graham School 1911–13 and the Schoonmaker School 1913–23, both private schools in New York City. She spent the year 1923–24 at, and graduated from, an all-girls boarding school, Hartridge School, in Plainfield, New Jersey. She enrolled at Vassar College in Poughkeepsie, New York, in 1924 and was elected to Phi Beta Kappa in her senior year. She graduated in 1928 with a degree in mathematics and physics, having attended beginning courses in all the sciences offered, as well as business and economics courses. She attended Yale University on a Vassar College fellowship 1928–29 and on a Sterling scholarship 1929–30 and received her MA in 1930.

During her childhood, Murray spent her summers at a family house on Lake Wentworth, near Lake Winnipesaukee, in Wolfeboro, New Hampshire. She met her future husband, Vincent Foster Hopper (1906–1976), in Wolfeboro during the summer of 1923. Their marriage took place on June 15, 1930, at the West End Collegiate Church in New York City, the same church in which her parents had been married. Vincent Hopper had graduated from Princeton in 1927 and received his MA there in 1928. That year he began his long association with New York University as an instructor of English in the School of Commerce, Accounts, and Finance (now the Leonard N. Stern School of Business).

Grace Hopper studied at Yale 1930–31, again on a Sterling scholarship. In 1931 she joined the faculty at Vassar as an assistant in mathematics. In 1934 she received her PhD from Yale and was promoted to instructor at Vassar. In 1932 Vincent Hopper was promoted to assistant professor, and in 1938 he received his PhD in English and comparative literature from Columbia University with a dissertation on medieval number symbolism. Grace Hopper apparently became interested in number symbolism, since in 1936 she published an article in the *Monthly* that begins "of all the fanciful and philosophical attributes said to have been assigned to numbers by the Pythagorean theorists, the most enigmatic is the apotheosis of the number 7 as Athena, sprung full-armed from the head of Zeus" (**1936**, 409).

In 1939 Grace Hopper was promoted to assistant professor, and she and Vincent Hopper built a home in Poughkeepsie. In 1940 she and members of a mathematics class made a movie animating a plane curve; she reported on the project in a note in the *Monthly*. Vincent Hopper remained at NYU, commuting to Poughkeepsie on weekends, and was promoted to associate professor in 1941. During 1941–42, Grace Hopper was absent on leave half-time from Vassar and studied at NYU's Center

for Research and Graduate Education in Mathematics (later Courant Institute of Mathematical Sciences) on a Vassar Faculty Fellowship.

After the bombing of Pearl Harbor in December 1941, Grace Hopper's husband and brother both enlisted in the Air Force, and her parents and sister worked in war-related jobs. A maternal great-grandfather, Alexander Wilson Russell, had been a rear admiral in the navy, and Grace Hopper wanted to join that branch of the military even though women were not accepted into the regular navy. Because she was over-age for enlistment in the WAVES (Women Accepted for Volunteer Emergency Service), and she worked in a profession (mathematics teaching) that was considered crucial, Hopper asked for a waiver to join the WAVES. During the summer of 1943 she taught an accelerated wartime calculus course as an assistant professor at Barnard College and joined the US Naval Reserve in December 1943. Hopper began a leave for military service in 1944 and from May 4 to June 27 of that year she served as an apprentice seaman and midshipman at the United States Naval Reserve Midshipman's School for Women in Northampton, Massachusetts. When she graduated she was commissioned a lieutenant (jg). By this time she and Vincent Hopper had separated; they were divorced in 1945 and had no children.

Immediately after graduation, Grace Hopper was assigned to work at Harvard University. On July 2, 1944, she reported for duty at the Bureau of Ships Computation Project housed in the Cruft Research Laboratory and began work on the Mark I computer, formally known as the Automatic Sequence Controlled Calculator. She worked as a mathematical officer under the direction of Howard Aiken, a commander in the Naval Reserve, writing code for the Mark I and, later, for the Mark II, the first multiprocessor. She was also given the job of compiling notes written about the Mark I into a book. She both edited and contributed to the volume that appeared in 1946. Although she continued to work at Harvard, Hopper's official assignment changed in October 1945 to the Boston branch of the Office of Research and Inventions. Hopper's transfer came shortly before the January 1, 1946, transfer of the Computation Laboratory from the sponsorship of the Bureau of Ships to that of the Bureau of Ordnance.

On June 1, 1946, Hopper was promoted to lieutenant and on August 7, 1946, she was released from active duty. She was thirty-nine and too old to transfer to the regular navy, which by then was admitting women. She decided to remain in the naval reserve and stay at the Harvard Computation Laboratory as a research fellow in engineering science and applied physics rather than return to her position at Vassar, where she had been promoted to associate professor in 1944. In 1947, while Hopper was still writing code for the Mark II at Harvard, a moth caused a failure in one of that machine's relays. The actual moth was saved in a logbook. In 1979, in the first issue of the IEEE's *Annals of the History of Computing*, James J. Horning wrote that "Capt. Grace Hopper turned up the original 'bug' in going back to the MARK I log books–the bug for whom debugging was named" (p. 70). In 1981 Hopper repeated that claim when she related the anecdote, "The First Bug," in the same journal (3, no. 3: 285–86); she correctly identified the computer as the Mark II but mistakenly put the year as 1945 instead of 1947. Since then several articles have appeared that document that both the terms "bug" and "debug" preceded the discovery of the now famous moth.

In 1949 Hopper left Harvard to become senior mathematician at the Eckert-Mauchly Computer Corporation. During World War II, J. Presper Eckert and John

Mauchly had built a computer, the ENIAC (Electrical Numerical Integrator and Calculator), at the University of Pennsylvania. In 1946 they formed their own company and built the BINAC (Binary Automatic Computer), which was completed at about the time that Hopper joined them in Philadelphia and for which Hopper was to write code.

In 1950 the Eckert-Mauchly Computer Corporation was bought by Remington Rand, and Hopper's title changed to Senior Programmer. She worked on the UNIVAC (Universal Automatic Computer) and in 1952 developed its first compiler. She was made Systems Engineer, Director of Automatic Programming Development. In 1955 Remington Rand merged with the Sperry Corporation and became the Remington Rand UNIVAC Division of Sperry Rand. Hopper remained with Sperry Rand, which later merged with Burroughs and is now known as UNISYS, until her retirement in 1971.

Starting in 1955, Hopper developed the first English-language data processing language, FLOW-MATIC. Computer languages, including the business oriented FLOW-MATIC, were machine specific and by 1959 it was clear that there had to be some sort of standardization in computer languages so that the same language could be used in the growing number of computers that were being developed. Grace Hopper was one of the leaders in the movement to develop a standardized business language for computers. The result was COBOL, Common Business Oriented Language. Although Hopper is often credited with developing COBOL, she was not among those who worked on the design of the language. However, she was a technical advisor to the executive committee overseeing the development of the language, and her work on FLOW-MATIC greatly influenced the actual developers of COBOL.

In 1959 Hopper was made Chief Engineer, Automatic Programming, of the UNIVAC division of Sperry Rand. In 1961 she became Director, Research - Systems and Programming, and in 1964 was made Staff Scientist, Systems Programming. During this period Hopper also taught at the University of Pennsylvania's Moore School of Electrical Engineering, starting as a visiting lecturer in 1959 and ending as a visiting associate professor in 1963. When she retired in 1971, Hopper was made professorial lecturer in management science at George Washington University in Washington, D.C., and held that position until 1978. In 1973 the Moore School made her an adjunct professor of engineering.

During her years in the naval reserve, Hopper was promoted to lieutenant commander on April 1, 1952, and then to commander on July 1, 1957. She was involuntarily retired at the end of 1966. However, on August 1, 1967, she was returned to active duty having been asked to standardize COBOL for the navy. She was to have served only six months but did not retire again until 1986. From August 1967 until September 1968 she served in the office of the Special Assistant to the Secretary of the Navy as director of the navy programming languages group. For the next nine years, until September 1976, she was assigned to the office of the Chief of Naval Operations as the head of the programming languages section. Her last ten years in the naval reserve were spent with the Naval Data Automation Command as head of the training and technology directorate and special advisor to the commander. She was promoted to captain on August 2, 1973, and to commodore on November 8, 1983; two years later the rank was raised to rear admiral (lower half). She was on military leave from Sperry during her final four years of official employment there

and was a senior consultant for Digital Equipment Corporation after her final, again involuntary, retirement from the naval reserve in 1986.

Hopper's retirement ceremony took place on August 14, 1986, aboard the USS *Constitution*, the navy's oldest commissioned warship. Hopper had requested that site for the occasion since at seventy-nine she was the oldest officer on duty in all of the armed services; she was also the last WAVE to remain on active duty. During the retirement ceremony she received the Navy Distinguished Service Medal and was named the First Fellow of the Boston Computer Museum.

Hopper was a member of a very large number of scientific and professional organizations, including the following that are not listed below: the Data Processing Management Association, the Association of Computer Programmers and Analysts, the Franklin Institute, the International Oceanographic Foundation, the Armed Forces Communications and Electronics Association, the Planetary Society, the New York Academy of Sciences, the Oceanic Society, the American Institute of Industrial Engineers, the US Naval Institute, the Association for Women in Computing, the Charles Babbage Institute, the Navy Women's Association, the World Future Society, and the Ordnance Association. She was also a member of the Mary Murray chapter of the DAR, the Dames of the Loyal Legion, and many historical and genealogical societies, as well as the Clan Campbell Society, the Clan MacPhearson Association, the Retired Officers Association, and the American Rose Society. She served on various committees of the Association for Computing Machinery: the committee on nomenclature 1953–56, the council 1957–58, and the *Communications* editorial board 1957–58. When SIAM was formed in 1952 she was elected vice president and later served as chairman of the planning committee 1953–54 and trustee 1957–59. In 1975 she served on the *IEEE Spectrum* editorial board.

Among the many honors and awards bestowed on her are nearly fifty honorary doctorates and seven military medals. Among her awards and nonmilitary medals are the Naval Ordnance Development Award (1946), the Society of Women Engineers SWE Achievement Award (1964), the first Data Processing Management Association Computer Science "Man-of-the-Year" Award (1969), the American Federation of Information Processing Societies Harry Goode Memorial Award (1970), Yale University Wilbur Lucius Cross Medal (1972), the Legion of Merit (1973), IEEE W. Wallace McDowell Award (1979), the IEEE Computer Pioneer Medal (1983), the AAUW Achievement Award (1983), the Federally Employed Women Achievement Award (1983), the ACM Distinguished Service Award (1983), the Association of Women in Computing Ada August Lovelace Award (1983), the Federation of Government Information Processing Council Lifetime Achievement Award (1986), the National Medal of Technology (1991), and the DAR medal to women "worthy of honor" (posthumously). She was elected a Fellow of IEEE in 1962, of AAAS in 1963, of the Association of Computer Programmers and Analysts in 1972, and of the Institute for the Certification of Computer Professionals in 1981. In 1973 she was elected to membership in the National Academy of Engineering and was made a Distinguished Fellow of the British Computer Society, the first American and the first woman so honored. In 1974 she was inducted into the Engineering and Science Hall of Fame. Twenty years later she was inducted into the National Women's Hall of Fame in Seneca Falls, New York.

Captain Grace Murray Hopper Day was declared in New Hampshire on November 7, 1983, the day the Grace Murray Hopper Center for Computer Learning was

opened at the Brewster Academy, a private school in Wolfeboro. The Grace Murray Hopper Service Center of the Navy Regional Data Automation Center in San Diego, California, was dedicated on July 28, 1987. Hopper's awards and honors are displayed at the Center in San Diego. In 1996 a guided missile destroyer was christened the USS *Hopper*. She was seen by many on a segment of *60 Minutes* in 1983, the David Letterman Show in 1986, and as grand marshal of the Orange Bowl Parade in 1987. Her interview as one of eight American women of achievement was published by the Voice of America, US Information Agency, in 1984. The Grace Murray Hopper Award was established by the UNIVAC division of the Sperry Rand Corporation in 1971 and is now supported by UNISYS; it is presented annually by the ACM to the outstanding young computer professional of the year. In 1994 the first Grace Hopper Celebration of Women in Computing Conference was held. It is now held every two years and is sponsored by the Anita Borg Institute for Women and Technology and the ACM.

Grace Hopper died in her sleep at her home in Arlington, Virginia, on New Year's Day 1992. She was eighty-five at the time of her death and was buried at Arlington National Cemetery on January 7, 1992, with full military honors.

Organizational affiliations: AMS, MAA, SIAM, AWM, IMS, ACM, IEEE, SWE, AAAS, Phi Beta Kappa, Sigma Xi.

Dissertation:

1934 New types of irreducibility criteria. PhD dissertation, Yale University, directed by Oystein Ore.

Selected publications:

1936 The ungenerated seven as an index to Pythagorean number theory. *Amer. Math. Monthly* 43:409–13. Review: *JFM* 62.0010.04 (K. Vogel).

1940 Mathecinematics. *Amer. Math. Monthly* 47:565–67.

1946a (Editor) *A Manual of Operation for the Automatic Sequence Controlled Calculator*, by the staff of Computation Lab. Annals of the Harvard Computation Laboratory, vol. 1. Cambridge: Harvard Univ. Press. Author of chapters on history, machine description, and electromechanical circuit operation. Extracts appear in Aiken & Hopper 1946. Review: *Math. Tables Other Aids Comput.* 2:185–87 (Mach. Devel. Lab). Reprint: Reprint Series on the History of Computing, vol. 8. Charles Babbage Institute.

1946b with H. Aiken. The automatic sequence controlled calculator. *Electr. Eng.* 65:384–91, 449–54, 522–28. Reviews: *Math. Tables Other Aids Comput.* 3:210 (pt. 1) and 3:377–78 (pts. 2 & 3) (Mach. Devel. Lab); *Zbl* 061.29709 (A. Speiser). Reprint: 1973. In *The Origins of Digital Computers. Selected Papers*, ed. B. Randell, 199–218. Berlin: Springer-Verlag. Translation: Russian, 1948. An automatically controlled calculating machine. *Uspekhi Mat. Nauk* n.s., 3:119–42.

1953a Compiling routines. *Comput. & Automat.* 2 (4): 1–5.

1953b with J. W. Mauchly. Influence of programming techniques on the design of computers. *Proc. IRE* 41:1250–54. Reprint 1997: *Proc. IEEE* 85:470–74; abstract of reprint: *Appl. Sci. Technol. Abstracts* BAST97024649.

1954 (Chair of Committee on Nomenclature, compiler) *First Glossary of the Programming Terminology: Report to the Association for Computing Machinery.* New York: Association for Computing Machinery.

1955a Automatic coding for digital computers. *Comput. & Automat.* 4 (9): 21–24. Presented at Second Annual High-Speed Computer Conference, Baton Rouge, LA, 16 Feb 1955. Proceedings published by Remington Rand, Inc.

1955b Automatic programming for computers. *Systems* 19 (5): 3–4.

1956 Programming business-data processing. *Control Eng.* 3 (10): 101–06.

1957a Automatic programming for computers. *Punched Card Annu.* 5:197–98.
1957b Computer programs "in English." *Systems* 21 (5): 13–14.
1957c Tomorrow–automatic programming. *Petroleum Refiner* 36 (2): 109–12.
1958 From programmer to computer. *Indust. Eng. Chem.* 50:1661.
1959a Automatic programming present status and future trends. *Mechanisation & Thought Process* 1:157–200. Presented to the National Physics Laboratory Symposium, London, England, Nov 1958. Review: *Zbl* 098.10110 (P. Koch).
1959b Education can be "Secondary." *Systems for Educators* 6 (2): 87–88.
1959c Progress in automatic coding for business data-handling. *Automation* 6 (5): 162–66.
1969 Standardization of high level programming languages. *Data Processing* 14:329–35.
1970 Standardization and the future of computers. *Data Management* 8 (4): 32–35.
1976 David and Goliath. In *Computers in the Navy*, ed. J. Prokop. Annapolis, MD: Naval Institute Press.
1984 with S. L. Mandell. *Understanding Computers*. St. Paul, MN: West Publishing Co. (with study guide and video tape). Second ed.: 1987. St. Paul, MN: West Publishing Co. Third ed.: 1990. St. Paul, MN: West Publishing Co.
1985 Future possibilities: data, hardware, software, and people. In *Naval Tactical Command and Control*, ed. G. R. Nagler. Washington, DC: AFCEA [Armed Forces Communication and Electronics Association] International Press.
1988 The education of a computer. *Ann. Hist. Comput.* 9:271–81. Presented to the ACM, Pittsburgh, PA, 3 May 1952; originally published in *Proceedings of the Association for Computing Machinery*, 243–49, (Pittsburgh, PA: Richard Rimbach Assoc., 1952). Presentation with same title to the Symposium on Industrial Applications of Automatic Computing Equipment, Midwest Research Institute, Kansas City, MO, 8–9 Jan 1953.
1999 Commander Aiken and my favorite computer. In *Makin' Numbers: Howard Aiken and the Computer*, ed. I. B. Cohen and G. W. Welch with R. V. D. Campbell, 185–93. Cambridge, MA: The MIT Press.

Selected articles in conference proceedings:

1954 Automatic Programming. In *Symposium on Automatic Programming for Digital Computers, 13–14 May 1954 [Papers]*, 1–5 (Definitions) and 148–49 (Summary). Washington, DC: US Dept. of Commerce, Office of Technical Services. Prepared by the Navy Mathematical Computing Advisory Panel.
1956 The interlude 1954–1956. In *Symposium on Advanced Programming Methods for Digital Computers: Washington, DC, June 28, 29, 1956*, 1–2. Washington, DC: Office of Naval Research, Dept. of the Navy. Symposium jointly sponsored by the Navy Mathematical Computing Advisory Panel and the ONR.
1959a Automatic programming language and programming aids. In *Computers for Artillery Conference: Proceedings, February 24–26, 1959*, 191–92. Fort Sill, OK: US Army Artillery and Missile School.
1959b Conversion of electronic data-processing. In *10th Annual AIIE [Amer. Inst. Indust. Eng.] Conference Proceedings Manual: 14–15–16 May, 1959, Biltmore Hotel, Atlanta, Georgia*, 157–59. Atlanta, GA: Dickson's.
1959c A data-processing compiler. *Data Processing* 1959: 69–76. Proceedings of the Nat. Machine Accountants Assoc.
1961 Automatic coding - 1960. In *Automatic Data Processing Seminar for Federal Executives. Graduate School, USDA*. Washington, DC. Papers from the 3d seminar, 28 Sept 1960–10 Nov 1960.
1962 Business data processing – a review. In *Preprint of the proceedings of the IFIP* [Intl. Fed. Info. Processing] *Congress*, 35–39. Amsterdam: North Holland. 17 Aug–1 Sept 1962, Munich, Germany.
1969a Looking ahead to the 70's. In *Proceedings*, 1–9. UNIVAC Users Assoc. Conference.

1969b Standardization of high level languages. *AFIPS* [Amer. Fed. Info. Processing Socs.] *National Computer Conference. Conference Proceedings* 34:608.
1970 Computer software. In *Computers and Their Future: Speeches Given at the World Computer Pioneer Conference, Llandudno, July 1970, Also Questions and Answers*, Llandudno: Richard Williams and Partners.
1972 Possible futures and present actions. In *Proceedings of the 5th Australian Computer Conference, Brisbane, 1972, May 22nd to 26th*, 272–76. Melbourne: Australian Computer Society.
1973 Dispersal of computer power. In *Conference 73: Proceedings, Ottawa, March 26, 27, 28, 1973*, 74–80. Ottawa, ON: The Institute. Data Processing Inst. Conference.
1974 Technology: future directions. In *Conference 74: Proceedings, Ottawa, June 10, 11, 12, 1974*, 251–56. Ottawa, ON.: Data Processing Institute.
1981 Keynote address. In *History of programming languages*, ed. R. L. Wexelblat. New York: Academic Press. Proceedings of the History of Programming Languages Conference, Los Angeles, 1–3 June 1978.

Abstract not listed above:
1934 New types of irreducibility criteria. *Bull. Amer. Math. Soc.* 40:216 #216. Based on PhD dissertation. Presented with Oystein Ore to the AMS, New York City, 30 Mar 1934.

Selected references to: AmMSc 6–8, 9P–11P; AmMWSc 12P–13P, 14–18; AmNatBi; AmWom 1935–40; AmWomSc; AmWomTe; AZWoSci; BiDSci 2; BiDWSci; BioWMath; CamDcAB 1–2; ConAu 164; DcWomW; EncWB 2; HisDcDP; InWom SUP; MacTutor; NotMat; NotTwCS 1; NotWoMa; NotWoSc; Sc&ItsT 7; WhAm 10; WhoAm 38–42, 46; WhoAmW 1–4, 6–8, 13, 16–17; WomFir; WomWorHis.
Voysey, H. L. "Computer Pioneer Looks Ahead." *Computer Bull.* 11, no. 2 (Sept 1967): 114–15.
"Computer Sciences Man-of-the-Year." *J. Data Management* 7, no. 6 (June 1969): 75.
Dataweek 7, no. 12 (18 June 1969): 6–7 and cover.
"On the Top Deck of the Pentagon." *Computer Survey* (July–Aug 1969): 351.
Tathan, Laura. "Commander Grace Hopper - COBOL Pioneer Talks of the Future." *Computer Bull.* 13, no. 8 (Aug 1969): 288–90.
Lambeck, Alfred. *Zeitschrift für Datenverarbeitung* (Oct–Nov 1969): 549.
"Le COBOL standard, interview de Grace M. Hopper." *L'Informatique* 1, no 2 (Mar 1970): 40–49.
"Women in Business: Pioneer in Computers." *New York Times*, 5 Sept 1971.
"Grace Murray Hopper." *AWM Newsletter* 3 (Sept 1973): 8–9.
Testorff, Ken. "The Lady is a Captain - She Teaches Computers How to Talk." *All Hands* no. 700 (May 1975): 32–35.
Mason, John F. "Grand Lady of Software - Grace Hopper: It's Rewarding Trying to do Things in a New Way." *Electronic Design* 22 (25 Oct 1976): 82–86.
"The Captain is a Lady." New York: Carousel Films, 1983. Videocassette from the Television Program: 60 Minutes. Transcript in Schlesinger Library, Radcliffe Institute, Harvard University.
"Captain Grace M. Hopper Honored at Brewster Academy in Her Hometown of Wolfeboro, New Hampshire." *AWM Newsletter* 14 (Mar–Apr 1984): 5–6.
Tropp, Henry S. "Grace Hopper: The Youthful Teacher of Us All." *Abacus* 2, no. 1 (Fall 1984): 7–18.
Cushman, John H., Jr. "Admiral Hopper's Farewell." *New York Times*, 14 Aug 1986.
"'Amazing Grace' Takes Final Leave from Navy Post." *Washington Post*, 15 Aug 1986.
Leopold, George. "Beacon for the Future." *Datamation* 32 (1 Oct 1986): 109–10.
King, Amy C. with Tina Schalch. "Grace Brewster Murray Hopper (1906–)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 67–73. Westport, CT: Greenwood Press, 1987.

Billings, Charlene W. *Grace Hopper: Navy Admiral and Computer Pioneer*. Hillside, NJ: Enslow Publishers, Inc., 1989.
Markoff, John. "Rear Adm. Grace M. Hopper Dies: Innovator in Computers Was 85." *New York Times*, 3 Jan 1992.
Pearson, Richard. "Adm. Hopper Dies; Pioneer in Computers." *Washington Post*, 4 Jan 1992.
"Grace Murray Hopper 1906–1992." *Notices Amer. Math. Soc.* 39 (1992): 320.
Obituary. *IEEE Ann. Hist. Comput.* 14, no. 2 (1992): 56–58.
Sammet, Jean E. "Farewell to Grace Hopper – End of an Era!" *Comm. ACM* 35 no. 4 (Apr 1992): 128–31.
Mitchell, Carmen L. "The Contributions of Grace Murray Hopper to Computer Science and Computer Education." PhD dissertation, University of North Texas, 1994.
"Ship Named for Grace Hopper." *Computer* 29, no. 3 (1996): 99.
Fenster, J. M. "Amazing Grace of the Information Age Was a Military Lady." *Invention & Technology* 14, no. 2 (Fall 1998): 24–31.
"Grace Murray Hopper." In *Naval History and Heritage Command: NHHC Biographies*.
Williams, Kathleen Broome. "Grace Murray Hopper: Computer Scientist." Chap. 4 in *Improbable Warriors: Women Scientists and the U.S. Navy in World War II*. Annapolis, MD: Naval Institute Press, 2001.
Williams, Kathleen Broome. *Grace Hopper: Admiral of the Cyber Sea*. Annapolis, MD: Naval Institute Press, 2004.
LaDuke, Jeanne. "Hopper, Grace Murray." In *Notable American Women: A Biographical Dictionary, Completing the Twentieth Century*, ed. Susan Ware, 309–11. Cambridge, MA: Belknap Press of Harvard University Press, 2004.
"Grace Hopper: The Navy and Computers." In *Women Mathematicians and NMAH Collections* (NMAH Object Group).

Related manuscript materials:

Grace Murray Hopper Collection, 1944–1965 #324, National Museum of American History, Smithsonian Institution, Washington, DC. Finding aid.

Selected unpublished interviews:

Grace Murray Hopper (1906–1992). Interview by Uta C. Merzbach, July 1968. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution. Transcript.
Grace Murray Hopper (1906–1992). Interview by Uta C. Merzbach, Nov 1968. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution. Transcript.
Grace Murray Hopper (1906–1992). Interview by Uta C. Merzbach, 7 Jan 1969. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution. Transcript.
Grace Murray Hopper (1906–1992). Interview by Uta C. Merzbach, 4 Feb 1969. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution. Transcript.
Grace Murray Hopper (1906–1992). Interview by Beth Luebbert and Henry Tropp, 5 Jul 1972, Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution. Transcript.
Grace Hopper. Interview by Christopher Evans, ca. 1976. Cassette number 19, in *Pioneers of Computing, 1975–1976*, Science Museum, London. Transcript, OH81, Charles Babbage Institute, University of Minnesota, Minneapolis.
Grace Murray Hopper, 1906-. Interview by Linda Calvert, 3 Sep 1982–28 Feb 1983, Washington, D.C. Women in the Federal Government Oral History Project, OH-40, folder #14, Schlesinger Library, Radcliffe Institute, Harvard University. Transcript.

Other sources: Owens questionnaires 1937, 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; Peggy Aldrich Kidwell, "Stalking the Elusive Computer Bug," *IEEE Ann. Hist. Comput.* 20, no. 4 (1998): 5–9; Alumnae and Alumni of Vassar College; Vassar College Archives; US Census 1900 NJ, 1910, 1920, 1930 NY.

Last modified: January 29, 2016.

HOWE, Anna M. October 24, 1883–August 8, 1976.
Wells College (BA 1908), Cornell University (MA 1911, PhD 1917).

Anna Mayme Howe was born in Jordan, New York, the second of two children of Eleanor Caldwell (Reed) (1855–1943) and Lewis B. Howe (1852–1928), natives of New York. At the time of the 1900 census the family lived in Auburn, in upper New York State; her parents had been married twenty-one years; and her father's occupation was listed as city missionary. A 1900 Auburn city directory lists Lewis B. Howe as superintendent of the Gospel Knowledge and Mission Union; a 1917 directory of Onondaga County lists him as a farmer in Jordan, New York. Her older brother, Raymond R. (1882–1953), graduated from Yale University in 1905.

Anna Mayme Howe graduated from the high school in Auburn, New York, in 1902, having taken the Latin-scientific course. When she entered nearby Wells College in 1904, shortly before she turned twenty-one, she was one of fifty-nine entering freshmen. The tuition was $100 per year, and the board, consisting of "furnished room, light, heat, and the washing of one dozen plain pieces weekly" was $300 (Wells College catalogue 1904–05). While Howe was at Wells, the mathematics professor was Anna Lavinia Van Benschoten, who received her doctorate from Cornell in 1908, having taken a leave of absence from Wells during Howe's junior year, 1906–07. Howe graduated in 1908, at age twenty-four, and taught mathematics the next two years.

Howe studied at Cornell 1910–11 and received her master's degree in 1911 with a major in mathematics and a minor in education. She then became head of the mathematics department at Fairmont Seminary, a school for girls in Washington, D.C., that is now closed. She indicated later that she was teaching both high school and college work while there. She remained at Fairmont until 1915, when she returned to Cornell with a graduate scholarship in order to work toward her doctorate. She wrote her dissertation with Virgil Snyder in algebraic geometry, had a minor in mathematical analysis, and took courses in physics. Her dissertation appeared in 1919 in the *American Journal of Mathematics* and was cited a number of times by a fellow Cornell student, Temple Rice Hollcroft, who was professor at Wells College 1918–54. Howe received her doctorate in September 1917 and returned to Fairmont to teach for an additional year.

It appears that the following year, 1918–19, Howe was overseer of technical shipments for W. R. Grace and Company in New York. In the fall of 1919, she became a teacher of mathematics at Dana Hall, Wellesley, a girls' preparatory school founded in 1881 to address the needs of early Wellesley College students requiring additional preparation. The following May, in response to a letter about an opening, Howe wrote to the dean of H. Sophie Newcomb College, Tulane University, in New Orleans, about a teaching position in the mathematics department there. Details of her subsequent hiring and employment at the college appear in letters cited below that are in the Tulane University Archives. In her letter of May 3, 1920, to Dr. Pierce Butler, Howe wrote that her "present salary began last October with $1400 plus all living expenses but this was increased for the last four months at the rate of $50/month. . . . Miss Cooke, the Principal of Dana Hall requests me to remain here but I much prefer college work in Mathematics." A letter of recommendation of May 17, 1920, from Gertrude E. Preston, the head of the mathematics department at Dana Hall, to Butler notes that Howe "has done excellent work in Dana Hall. . . .

You will find her an earnest young woman, of scholarly attainments and a winning personality. Her ideals, both as scholar and teacher, are high." Howe accepted the offer of an instructorship for $1500 with board and lodging in the college residence (folder: Howe, Anna M., Tulane University Archives).

Howe was on the faculty at Newcomb until 1930: as instructor 1920–21 and as assistant professor 1921–30. She attended the International Mathematical Congress in Toronto in 1924 and afterwards reported on bookstores at various women's colleges in the East, apparently a task she had been assigned by her college dean before Newcomb established its own bookstore. In 1925–26, Howe received an extra $300 stipend to serve as financial secretary in charge of bookkeeping and finances for a new Club Dormitory. The first year ended with financial success and satisfied students, but Howe was told she must make different arrangements for 1926–27. She was to receive room and board but no extra stipend because there were no extra duties. Howe was elected to the graduate school faculty in 1926 and planned to give a course in projective geometry, "exactly as it has been given by Miss Spencer" according to her dean's recommendation to the graduate dean. Mary Cass Spencer, MS, had been professor at Newcomb since the turn of the century.

In March 1927, Howe had to return home to New York State because of her father's illness. In a letter of June 24, 1928, Howe explained to the dean that she and her mother would be occupying two rooms and eating "in the cafeteria at faculty rates or elsewhere." In the same letter, Howe requested a raise for the following year. She closed by thanking the dean for "trying to make next year financially possible for mother and me."

On May 3, 1930, Howe submitted her resignation to the dean of Newcomb College. A letter of recommendation of February 18, 1931, from Dean Butler to Florence Lewis at Goucher notes, "I do not hesitate to tell you that the real reason for Miss Howe's leaving Newcomb was only her own dissatisfaction in that she was not considered suitable for promotion to the head of the department upon the retirement of Miss Spencer. It was felt that she did not have the necessary personal force, or the necessary health for such position. Miss Howe, quite naturally, was disappointed, and resigned her position. We should have continued her in the position she had been filling satisfactorily." When Howe left in 1930, she was replaced by Marie Weiss.

In 1930, Howe and her widowed mother moved back to Jordan, New York, and Howe sought employment in the area. While her work history at this time is somewhat unclear, it appears that Howe found a position about forty miles away at the new Cazenovia Central School in the early 1930s. She indicated in 1937 that she was head of the department at Cazenovia Central School and that she had been supervisor of mathematics in Cazenovia, New York, since 1930. Elsewhere, she reported that she was head of the department in schools in New York from 1931 to 1948. In May 1942, the former Cazenovia Seminary closed, and the school became Cazenovia Junior College. At that time, Howe became professor and head of the department at the college (now Cazenovia College). She remained there until 1957.

Howe was involved in a number of professional and non-professional activities. She became a charter member of the MAA at the time of its founding in 1915, the year she returned to graduate school to complete her doctoral studies. Throughout her career she attended many national and sectional meetings; the last was a national summer meeting held at Cornell in 1965 celebrating the fiftieth anniversary

of the founding of the MAA. In 1928 she was treasurer for the New Orleans Convention of the AAUW, which met at a local hotel April 9–12. In the late 1930s, she reported that she was president of the local county mathematics club, and that she was organizing a three-year course in mathematics (subvocational) for non-college entrance students. At that time she was also a member of a literary society, and she described her interests as traveling, music, and gardening. In the mid-1950s, she reported her professional interests as teaching methods and educational statistics, and noted that she had been a member of the National Education Association.

According to her obituary, Howe was founder and former president of the Madison County Mathematics Association. She was a member of the New York Mathematics Teachers Association; the American Association of Junior Colleges; Zeta Tau Alpha, a national social sorority; Phi Theta Kappa, an honorary fraternity for men and women in two year college education; Daughters of the American Revolution; the League of Women Voters; and the New York State Citizens Council.

Howe moved back to Jordan after her years at Cazenovia. After her return she was a member of the Jordan Study Club, the Jordan Historical Society, and the Jordan Community Council as well as the First Church of Christ, Scientist, of Syracuse. Anna Howe died in 1976 at age ninety-two in a nursing home in Auburn, New York, and was survived by two nephews and a niece. She is buried in Maple Grove Cemetery of nearby Jordan, along with her parents, brother, and sister-in-law. The Howe Mathematics Award at Cazenovia College is given to a student with the highest average who has also demonstrated originality and deep interest in mathematics.

Organizational affiliations: AMS, MAA (charter member), NCTM, NEA, AAUW, Sigma Xi.

Thesis and dissertation:
1911 Problems in photogrammetry. MA thesis, Cornell University, directed by Joseph Vance McKelvey. Typescript.
1917 The classification of plane involutions of order three. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Published version, 1919, reprinted from *Amer. J. Math.* 41:25–48.

Publication:
1919 The classification of plane involutions of order 3. *Amer. J. Math.* 41:25–48. Published version of PhD dissertation. Reviews: *JFM* 47.0570.02 (W. Fr. Meyer); *Rev. semestr. publ. math.* 27, pt. 2: 2 (E. B. Cowley).

Presentation:
Some problems in projective geometry. Presented to a meeting of the MAA, Jackson, MS, 20–21 Mar 1925.

References to: AmMSc 3–4, 9P.
"Dr. Anna Howe; Retired Professor." (Obituary) *Syracuse Herald-Journal*, 9 Aug 1976.

Other sources: Owens questionnaires 1937, 1940; Center for Research Libraries College Catalog Collection; Rare and Manuscript Collections, Cornell University Library; New York State Archives; Tulane University Archives; communication with Frederic and Jean Williams Archives, Cazenovia College; US Census 1900, 1910, 1920 NY, 1930 LA.

Last modified: March 7, 2009.

HSIA, Shu Ting (Liu). September 25, 1903–August 16, 1980.
University of Michigan (BS 1926, MS 1927, PhD 1930).

Shu Ting Liu was born in Beijing, China, the eldest of several children of Shien-Ying Chen and Te-Yuang Liu. In 1925 her father was described as a railroad engineer. One of her siblings was a foreign minister in the Taiwan government until after 1967.

Apparently her precollege schooling, and possibly some university education, was obtained in Beijing before she came to the United States. It appears that she entered the University of Michigan in Ann Arbor in 1923 and remained through August 1929. In 1923 she listed as guardian Mrs. Heking, a former dean of Peking University, who at the time was living in Ann Arbor. Shu Ting Liu attended Michigan as a holder of a Barbour Scholarship for Oriental Women, from a scholarship program funded by Levi L. Barbour and established by the university in 1917 for women from Asia who planned to study medicine or education. At the same time, Barbour donated money for the building of the Betsy Barbour dormitory for women, where Liu lived for at least two years as a graduate student. She was a member of the Chinese Students Club at Michigan some years as an undergraduate and graduate student.

Shu Ting Liu earned a bachelor's degree in 1926, a master's degree in 1927, and finished her work for the PhD in August 1929. In 1927 she was paid $75 to work as an assistant in the electrical engineering department. Despite the title of her PhD dissertation, "Theory of periodic orbits for asteroids of integral types," her degree was in mathematics; her dissertation gave "the construction of periodic solutions of the differential equations for the plane motion of an infinitesimal body subject to the attraction of Jupiter and the Sun." The doctorate was conferred in March 1930.

Liu was a substitute instructor for an ill faculty member for two months in 1929 at Colorado College in Colorado Springs. In December 1929, Liu married Pin Fang (also "Pinfang") Hsia (1902–1970) in Colorado Springs. Hsia, born in Anhui Province in eastern China, attended Tsinghua University in Beijing before coming to the United States as a Chung Hua scholar from Beijing and graduating from Colorado College and then from the Harvard Graduate School of Business Administration in about 1929.

In April 1930, the Hsias were living in Detroit, Michigan, where he was working with stocks and bonds. That summer they returned to China. In November 1930, Shu Ting Liu Hsia reported to the Michigan alumni office that she was a teacher in Shanghai College. On November 24, 1931, Yujen Edward, the first of their two children, was born in Shanghai. Their daughter, Lucia, was born June 9, 1937, also in Shanghai. Soon thereafter the family escaped to Hong Kong, presumably at the time of the Battle of Shanghai, which began in August 1937. A short article in the *Colorado College Alumni News* in December 1941 notes, "Mr. and Mrs. Hsia lost all their household furnishings ... in a raid by the Japanese before the couple returned to the United States" (Colorado College Archives).

In August 1939, the Hsia family arrived in the United States, where they remained until 1946. During that period Pinfang Hsia was manager of the Bank of China in New York. In 1944, Shu Ting Hsia reported that, in addition to caring for her children, she was also engaged in teaching. She was listed as a temporary,

part-time instructor at Hunter College for the academic year 1944–45. In 1944 her husband went to Canada to set up a branch office.

In 1946 Pinfang Hsia was transferred to the branch in London, where he was resident manager of the Bank of China and was responsible for major expansion into Europe. Shu Ting Hsia and Lucia returned to New York in 1950 after the government changed in China. Yujen Edward Hsia was, at the time, a student at Oxford University. Lucia Hsia attended Wells College and married in 1959; she later divorced. Pinfang Hsia stayed on in London until the legal question of bank ownership was resolved. He later became alienated from both the nationalist and Communist headquarters of the Bank of China, submitted his resignation, and returned to New York, where he worked for Magnus Mabee & Reynard, an oil firm, until his retirement.

After Shu Ting Hsia returned to New York, she did some statistical work for the city of New York. Her application for a social security account number in 1957 indicates that she was then working for the New York City Youth Board.

Pinfang Hsia died in New York in December 1970, a year after becoming a US citizen. At the time of his death Y. Edward Hsia was an assistant professor of genetics at Yale University, and Lucia Hsia Chinn was living in San Antonio. Y. Edward Hsia has since retired from the University of Hawaii, where he specialized in pediatrics and medical genetics; Lucia Chinn died in California in 1995.

In an e-mail to one of the authors in June 1998, Y. Edward Hsia wrote about his mother: "My mother ... enjoyed working in mathematics, and I believe she enjoyed teaching, but her primary commitment must have been to establish a home for her family, which prevented her from pursuing a more formal career in mathematics. Interestingly, she was always interested in contract or tournament bridge and was trying to become a master after she retired." He continued, "My mother was a rare example in her time of someone with a fairly classical Chinese upbringing – as a woman – who took the exceptional course of venturing to [the] USA for higher education, and was able to win a scholarship and earn a doctorate. She remained, however, a little uncomfortable with American mores and idiom."

After her retirement Shu Ting Liu Hsia moved to New Haven, Connecticut. Having been in ill health for some time, she died, possibly from aplastic anemia, at age seventy-six in West Haven, Connecticut, in 1980. In 1981 a gift of $8000 was made to the University of Michigan from the estate of Shu Ting Liu Hsia. A share of this was to augment the Barbour scholarship fund, "as an expression of [her] gratitude for the scholarship given to [her]" (University of Michigan Alumni Records Office).

Dissertation:

1929 [Lui, S. T.] Theory of periodic orbits for asteroids of integral types. PhD dissertation, University of Michigan, directed by Louis Allen Hopkins. Typescript. PhD 1930.

Other sources: application for social security account number 1957; private communication with Yujen Edward Hsia, June 18, 1998; University of Michigan Alumni Records Office; communications with Colorado College Archives, University of Michigan Archives and Records Program, and with Bentley Historical Library, University of Michigan; "Pinfang Hsia, 68, Bank of China Aide," (Obituary) *New York Times*, 23 Dec 1970; US Census 1930 MI; SSDI.

Last modified: December 11, 2008.

HUGHES, Olive Margaret. December 13, 1899–December 29, 1936.
University of Saskatchewan (BA 1925, MA 1926), Bryn Mawr College (PhD 1934).

Olive Margaret Hughes was the daughter of Martha (Rogers) (1863–1948) and Daniel Hughes (1860–1930), both originally from farm families in Wales. By 1886, when their first child, Eleanor (1886–1960), was born, they had a dairy shop in London and lived there during the nearly twenty-year span when their eleven children were born. Olive was born in London, the ninth in the family where, after the first girl, there were five boys followed by five girls. The other children were Richard (1888–1958), William (ca. 1891–1947), (Daniel) Oscar (1892–1965), Vernon Austin (1893–1970), Lewis Maurice (1894–1957), Blodwen (Dolly) (1896–1911), Winifred (1898–1967), Norah (b. 1902), and Kathleen (1905–1969).

The family migration to Canada began in 1905 when the eldest son arrived in western Saskatchewan, near Maidstone. Most other family members followed during the next several years including the father and another son in 1908; the mother and youngest daughter, Kathleen, in 1909; and finally the eldest daughter, Eleanor, with Winifred, Olive, and Norah in 1912. The Hughes family farmed in western Saskatchewan after their emigration from England.

Olive Hughes began her education in London. After her arrival in Canada at age twelve, she attended the Dee Valley School, a one-room school house some distance from their farm. According to a 1984 account by her younger sister Norah Dodds in a local history, "Mother was getting a little worried because our attendance at Dee Valley School was very irregular due to poor roads and bad weather" (*Chain of Memories*, 80). Thus, in 1914, their mother rented a small house in North Battleford, about fifty miles away, so the four youngest girls could attend school there. Olive attended grades nine through eleven before teaching in the fall of 1917 at the Dee Valley School with a permit from Regina, the provincial capital.

Hughes finished grade twelve in North Battleford and apparently attended Normal School in Saskatoon and then taught. She entered the University of Saskatchewan, also in Saskatoon, in the fall of 1921 at age twenty-one and specialized in mathematics under the direction of G. H. Ling and L. L. Dines. She completed the standard three-year course in 1925, having taken off the year 1922–23. She was granted a BA with high honors in mathematics in 1925. She was vice president and president, respectively, of the university mathematical society during her last two years as an undergraduate, and was an assistant in the department her last year. The summer following her graduation, she studied mathematics at the University of Chicago and then returned to the University of Saskatchewan as a graduate student and assistant in the mathematics department. She received her master's degree in 1926.

Hughes remained at the university the next two years as an instructor and served as the faculty advisor to the mathematical society at least in 1927–28. She studied mathematics at the University of Chicago again during the summer of 1927.

Olive Hughes's enrollment at the University of Saskatchewan overlapped with that of her next older sister Winifred, who earned a BA with honors in biology in 1922 and an MA in 1924. Winifred Hughes earned a PhD in biology from the University of Chicago in 1929 and subsequently was professor of zoology at the

University of Alberta. Apparently these were the only Hughes children to receive regular university degrees.

Olive Hughes left her instructorship at the University of Saskatchewan at the end of the academic year 1927–28 to accept a fellowship at Bryn Mawr College. She studied at Bryn Mawr 1928–31, the first two years as a resident fellow. She took mathematics as her major subject and physics as her independent minor. Her PhD was granted in 1934, with her dissertation having been completed in 1931 under the direction of Anna Pell Wheeler.

According to the Bryn Mawr College 1934 commencement program, Hughes was principal of the Islay School District in Alberta, Canada, 1931–34. Records supplied by Allen Ronaghan, a Canadian historian associated with the museum of the school in Islay, indicate that she was there 1932–34, and that she taught grades seven through ten in one room of the two-room school. Mr. Ronaghan contacted three of her former students who commented on some aspects of her teaching at Islay. Their remarks included that she was "very intellectual," "very well prepared as a teacher," "kept to herself and did not go out into the community," "smoked cigarettes in secret," "read many books," and "stayed at school late, either preparing her class work or reading her own assignments."

It is unclear what Hughes did after receiving her PhD in 1934, although Bryn Mawr records show that she was residing on East Chestnut Street in Chicago, Illinois, in 1935. It is possible that she was with her sister Kathleen Hughes, who was working as a commercial artist in Chicago at that time according to the Hughes entry in *Chain of Memories*. Many years after Olive Hughes's death, a 1950 Bryn Mawr directory listed her address as in care of her sister Winifred in Edmonton, Alberta, about 135 miles west of her last confirmed address in Islay.

An extensive search for information about the date, place, and cause of her death has resulted only in the following, written by her sister Norah: "Her untimely demise in 1936 was due to a bus-train collision" (*Chain of Memories*, 83). The grave marker at the cemetery in Maidstone, Saskatchewan, reads:

In Loving Memory
Olive Hughes, Ph.D.
Born Dec. 13, 1899
Died Dec. 29, 1936

Thesis and dissertation:

1926 A development of plane analytic geometry by vector methods. MA thesis, University of Saskatchewan. Typescript.

1931 A certain mixed linear equation. PhD dissertation, Bryn Mawr College, directed by Anna Pell Wheeler. Printed version, 1935, reprinted from *Amer. J. Math.* 57:861–82. PhD granted 1934.

Publication:

1935 A certain mixed linear integral equation. *Amer. J. Math.* 57:861–82. Published version of PhD dissertation. Reviews: *JFM* 61.0421.02 (F. Rellich); *Zbl* 013.06601 (M. H. Stone).

Sources: PhD dissertation vita 1935; Bryn Mawr College Archives; Maidstone Cemetery; University of Saskatchewan Archives; communications with Bryn Mawr College Alumnae Office, Bryn Mawr College Archives, University of Saskatchewan Alumni Office, University of Saskatchewan Archives, Saskatchewan Vital Statistics Office; communication with Allen Ronaghan, historian; *North of the Gully*, compiled by North of the Gully History Book

Committee, Maidstone, Saskatchewan, 1981; *Chain of Memories*, Maidstone Rural History Book Committee, North Battleford, Saskatchewan, 1984; England Census 1901.

Last modified: December 11, 2008.

HULL, Mary Shore (Walker). June 1, 1882–September 18, 1952.
University of Missouri (BA 1903, MA 1904), Yale University (PhD 1909).

Mary Shore Walker was born in Wentzville, Missouri, the daughter of Harriett F. (Shore) (b. 1855) and Charles Joseph Walker (b. 1846), both of Missouri. At the time of the 1900 census her parents had been married nineteen years, and five of six children born were living. Mary Shore, seventeen, was the eldest, followed by Charles J., sixteen; Benjamin S., fourteen; Thomas L., ten; and Robert M., four. By 1910 her father, an attorney, was widowed and had moved to Columbia, Missouri.

Mary Shore Walker went to Wentzville high school, just west of St. Louis, after which she entered Arkansas Industrial University (now University of Arkansas) in 1889. After one year at Arkansas, she transferred to the University of Missouri and was there from 1900 until 1907. She received her bachelor's degree in 1903 and her master's degree in 1904. From 1904 to 1907 she continued part-time graduate study and taught as an assistant in mathematics. She joined the AMS in April 1905 and the following year participated in the preliminary meeting of the Southwestern Section of the AMS that was held in Columbia, Missouri.

Walker's graduate work at Missouri included theory of numbers with Oliver D. Kellogg, infinite series and Galois theory of substitutions with L. D. Ames, real variables and complex variables with E. R. Hedrick, differential equations with W. D. A. Westfall, Lie's theory of continuous groups with G. A. Bliss, Fourier's series and potential functions with L. M. DeFoe, projective geometry, and differential geometry.

In 1907 Walker was appointed instructor at Missouri and was also granted a leave of absence to continue her studies. She was at the Yale graduate school for the academic years 1907–08 and 1908–09 and had courses in differential equations and in integral equations with Max Mason, in geometrical analysis with P. F. Smith, elliptic functions and elementary and advanced theory of real variables with James Pierpont, celestial mechanics with E. W. Brown, and advanced analytic geometry with E. G. Bill. She wrote her dissertation in analysis under the direction of Pierpont. After receiving her PhD in 1909, Walker returned to the University of Missouri, where she was instructor of mathematics for two years.

On June 14, 1911, Mary Shore Walker and Albert Wallace Hull, a physicist, were married in Columbia, Missouri. Albert Hull was born in Connecticut on April 19, 1880, and earned his BA in 1905 and his PhD in 1909 from Yale University. He was a member of the physics department at Worcester Polytechnic Institute from 1909 until 1914, when he joined the research staff of the General Electric Company as a physicist at its research laboratory in Schenectady, New York.

The Hulls remained in Schenectady where, from 1928 until his retirement in 1950, Albert Hull was assistant director of the laboratory. In the entry for him in the *National Cyclopedia of American Biography*, it was written that he "was the developer of possibly more types of electron tubes than any other man." Among his many honors was election to the National Academy of Sciences. They had two children: Robert Wallace, born in 1917, and Harriet, born in 1919. Robert W. Hull earned a PhD in physics from MIT in 1943.

Mary S. W. Hull was active in a number of community organizations. In the late 1930s she reported that she was a member of the College Women's Club and the Parent Teacher Association, and was on the Board of Trustees of Brown School in

Schenectady. She also belonged to the First Presbyterian Church and the Daughters of the American Revolution.

Mary Walker Hull died at Ellis Hospital in Schenectady in 1952 when she was seventy. She was survived by her husband, her son and daughter, three brothers, and nieces and nephews. Albert W. Hull died in Schenectady on January 22, 1966, at age eighty-five.

Organizational affiliation: AMS, AAUW.

Thesis and dissertation:
1904 [Walker, M. S.] On finite groups with special reference to Klein's Ikosäder. MA thesis, University of Missouri. Typescript.
1909 [Walker, M. S.] A generalized definition of an improper multiple integral. PhD dissertation, Yale University, directed by James Pelham Pierpont.

Reference to:
"Mrs. Hull Succumbs in Hospital." *Schenectady Gazette*, 20 Sep 1952.

Other sources: Owens questionnaire 1937; Yale University Archives; NatCAB 53 (Hull, Albert Wallace); US Census 1900, 1910 MO, 1920, 1930 NY.

Last modified: December 11, 2008.

HUMPHREYS, M. Gweneth. October 22, 1911–October 6, 2006.
University of British Columbia (BA 1932), Smith College (MA 1933), University of Chicago (PhD 1935).

Mabel Gweneth Humphreys was born in South Vancouver, British Columbia, the only child of Mabel Jane (Thomas) (1885–1963) and Richard Humphreys (1880–1969). Her mother was born in London, England, and was a dressmaker, florist, and housewife. Her father was born in Pwllheli in Northwest Wales and was a machinist. They were married in 1910. Her secondary education was in North Vancouver, British Columbia. She attended North Vancouver High School 1925–28, the University of British Columbia 1928–32, Smith College 1932–33, and the University of Chicago 1933–35.

Humphreys held scholarships all four years she was an undergraduate at the University of British Columbia before graduating with honors in mathematics and earning the Governor General's Gold Medal in 1932. In 1981 she described how she came to study and live in the United States. "When I graduated in '32 the appropriation for the university had been cut so much that they stopped giving graduate work in mathematics that year. I was supposed to have an assistantship but it 'melted away.' So, [Professor F. S. Nolan] helped me apply for scholarships, fellowships in the United States and in Canada. And I received one at Smith College, a fellowship, and went there for my master's degree" (Smithsonian meeting tapes). At Smith she studied with Professors Neal McCoy, Susan Rambo, and Ruth G. Wood before receiving her master's degree in 1933. She also reported that Nolan and another of the mathematics professors at the University of British Columbia had gotten their doctorates at the University of Chicago. Therefore, after receiving her master's degree, Humphreys applied to Chicago where she was awarded a fellowship that she held for the next two years. She earned her PhD in 1935, having written her dissertation in number theory as a student of L. E. Dickson. Each year that she was at Chicago, she gave a talk at the department's Junior Mathematics Club.

After receiving her PhD, Humphreys remained in the United States and became a naturalized citizen in 1941. In 1981 she recalled her first attempts to find a job.

> I had hoped that the University of Chicago would hear about a job for me, but only one came through, and the male candidate who got his thesis at the same time got that job. In the meantime, I had registered at a teacher's agency in downtown Chicago, and many cards came in for the sum of something like $900, and you taught all the mathematics in the four years, and you were dean of women, or all of mathematics and coach some sport. I said to myself I wasn't going to do this; I was going to stick around in Chicago and wait tables somewhere and study more mathematics. After awhile a card came through from Kansas, a woman's college, and they needed a woman with a PhD in either mathematics or physics to teach both. This was a substitute position, which was vacant because Sr. Helen Sullivan ... was ill. I took that and taught there for that one year. I was very busy I must say, but it was a great apprenticeship. I enjoyed it very much. (Smithsonian meeting tapes)

Thus, her first position was instructor of mathematics and physics, 1935–36, at Mt. St. Scholastica College in Atchison, Kansas. Emma Olson was acting head of

the department the previous year and Sister M. Helen Sullivan became head in 1935. In 1936 Humphreys became an instructor at H. Sophie Newcomb Memorial College in New Orleans, Louisiana, where Nola Anderson (Haynes) was department chairman. In 1941, with Marie Weiss as chairman, Humphreys was promoted to assistant professor. In the summers of 1944 and 1946, she was assistant professor at Barnard College and Tulane University, respectively.

In 1949 Humphreys left Newcomb to become associate professor at Randolph-Macon Woman's College (now Randolph College) in Lynchburg, Virginia, where she was to remain for the rest of her career. That same year Gillie Larew, who had been chairman since 1936, became dean of the college. At the end of Humphreys' first year at Randolph-Macon she was named Larew Professor and head of the department. She remained as head until 1979. In 1973 she was also named Dana Professor; she retired in 1980 as the Gillie A. Larew and Charles A. Dana Professor Emeritus. During her tenure at Randolph-Macon, she was on sabbatical leave and holder of a faculty fellowship from the Fund for the Advancement of Education in the academic year 1955–56, during which she studied at the University of British Columbia and examined undergraduate programs at several colleges and universities during short visits. She was a National Science Foundation faculty fellow 1962–63 while on sabbatical as a visiting professor at the University of British Columbia.

For most summers from 1959 to 1970 Humphreys taught in NSF summer institutes for high school teachers held at Randolph-Macon. From 1965 to 1969 she worked for the Educational Testing Service; she was on a committee to construct a new institutional mathematics test 1965–67 and served as a consultant for the mathematics undergraduate record examination 1967–69. In 1975 she was a consultant for the American Council on Education on credit for mathematics courses given by nonacademic organizations.

Humphreys was active in the MAA at both the sectional and national levels. She was vice-chairman of the Maryland-District of Columbia-Virginia Section of the MAA 1952–53 and 1957–58. At the national level, she served on the Committee on Mathematical Personnel and Education in the mid-1950s, on the Board of Governors 1962–65 as Governor of her section, and on the Committee on the Undergraduate Program in Mathematics (CUPM) 1965–67. She was on the CUPM ad hoc committee to prepare a report identifying qualifications for a college teacher of mathematics; the committee prepared a report published by CUPM in 1967. Humphreys was also on the CUPM Panel on Mathematics in Two-Year Colleges 1966–67 and on the Joint Interim Central Coordinating Committee on Films and Television in the early 1960s. She was an MAA consultant and visiting lecturer 1973–75.

From the 1950s through the 1970s Humphreys gave many presentations across Virginia and the rest of the country. In the 1960s she often spoke at conferences about the CUPM recommendations for the mathematics curriculum, while in the 1970s she spoke at schools about mathematics in music and art. She produced two sets of lecture notes. One, "Linear algebra and analysis," was joint with H. F. Davis and comprised notes for a course given at the University of British Columbia in 1956–57; another, "Linear algebra and geometry," appeared in many versions, the latest in 1974.

Humphreys served as vice president of the local chapter of AAUP 1959 and 1974–75 and as president 1959–60 and 1973–74. She was treasurer of the local chapter

of Sigma Xi 1960–61 and 1966–68, secretary 1968–70, vice president 1970–72, and president 1972–74.

In 1981 Humphreys listed her hobbies as gardening and reading. She was active in the Natural Bridge Appalachian Trail Club and served as a member of the council in 1954, 1955, 1970, and 1971. She continued to live in Lynchburg after her retirement in 1980 and died at home in 2006, shortly before her ninety-fifth birthday. Her obituary indicates that she was "survived by her friends and other retirees from Randolph Macon Woman's College." Her estate included a bequest of $24,000 to the MAA.

At Humphreys' memorial service a tribute by her former student Carol Wood was read. Wood noted that "the words 'supportive' and 'empowering' were not current in the 60s but they apply to Gwen's demeanor towards her students, however undeserving and naive we were. Several of us have gone on to careers involving substantial mathematics, and owe a debt to her" (Benkart 2010, 14). Wood, a former president of the Association for Women in Mathematics, later proposed that AWM establish a mentoring award in Humphrey's honor, and this was done in 2010. The M. Gweneth Humphreys Award was funded by former students and colleagues from Randolph-Macon to "recognize an undergraduate mathematics teacher ... who has had a significant impact on one or more female students through mentoring" (Benkart 2010, 13).

Organizational affiliations: AMS, MAA, SIAM, NCTM, Canadian Math. Soc., AAAS, AAUP, AAUW, Sigma Xi.

Thesis and dissertation:
1933 A solution of the matrix equation $P(X) = A$. MA thesis, Smith College.
1935 On the Waring problem with polynomial summands. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, distributed by the University of Chicago Libraries, reprinted from *Duke Math. J.* 1:361–75.

Publications:
1935 On the Waring problem with polynomial summands. *Duke Math. J.* 1:361–75. Published version of PhD dissertation. Reviews: *JFM* 61.0153.01 (F. Behrend); *Zbl* 013.10306 (E. M. Wright). Presented by title as "The representation of integers as sums of values of quartic polynomials" to the AMS, Lincoln, NE, 30 Nov 1934; abstract: *Bull. Amer. Math. Soc.* 40:793 #310.
1972 Computers: new building blocks in education. *Alumnae Bull. Randolph-Macon Woman's College.* (Winter).
1979 with D. L. Bernstein, A. F. O'Neill, and M. Rees. Women mathematicians before 1950. *AWM Newsletter* 9 (4): 9–18. Transcription of a panel discussion sponsored by the AWM, Providence, RI, 9 Aug 1978, ed. P. Kenschaft.

Abstract not listed above:
1936 On the Waring problem. *Amer. Math. Monthly* 43:453 #5. Presented to the MAA, Topeka, KS, 14 Mar 1936.

Presentation not listed above:
How to keep mathematically alive while teaching. Presented to a meeting of the NCTM, Richmond, VA, 1975.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P–13P, 14–24; WhoAm 38–46; WhoAmW 1, 3–8; WhoMedi.
"Dr. Mabel Gweneth Humphreys." (Obituary) *Lynchburg News & Advance*, 6–8 Oct 2006.
"MAA Receives $24,000 Bequest from the Estate of M. Gweneth Humphreys." *MAA Focus* 29, no. 4 (2009): 35.

Benkart, Georgia. "A New AWM Prize: The M. Gweneth Humphreys Award." *AWM Newsletter* 40 (Jan–Feb 2010): 13–14.

Other sources: PhD dissertation vita 1935; Owens questionnaire 1937; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981.

Last modified: December 17, 2010.

HUNT, Mildred. May 8, 1888–December 14, 1975.
Denison University (Shepardson College) (BA 1909), University of Chicago (MA 1916, PhD 1924).

Mildred Hunt was born in Fairport, New York, the second of three children of Helen (Metcalf) (b. 1855) and Horace Holmes Hunt (1852–1897), natives of New York. The other children were Mary H. (b. 1885) and Horace Holmes (b. 1890). Her father attended Rochester Theological Seminary and was ordained in 1879; he died in Fairport at forty-five, when Mildred Hunt was nine years old. In 1900 Helen M. Hunt was matron of Shepardson College for Women in Granville, Ohio. The college became a part of Denison University that year. Mildred Hunt's brother attended Denison University, Columbia University, and Rochester Theological Seminary before being ordained and serving as a Baptist minister.

Mildred Hunt prepared for college in the preparatory department of Denison University before attending the university as a student in Shepardson College (now fully merged with Denison). After her graduation in 1909, she taught in Woodland College in Jonesboro, Arkansas, and at high schools in Brownsville, Ohio, and Sistersville, West Virginia. She was an instructor of Latin and Greek at Hillsdale College in Hillsdale, Michigan, 1912–15. During the academic year 1915–16, Hunt studied at the University of Chicago, where she had courses in Analytic Mechanics with Kurt Laves, Differential Equations and Definite Integrals with G. A. Bliss, Elliptic Integrals with H. E. Slaught, Solid Analytic Geometry and Theory of Algebraic Invariants with L. E. Dickson, Differential Geometry with E. J. Wilczynski, and Geometric Introduction to the Theory of the Complex Variable with A. C. Lunn. Her master's thesis was directed by Dickson, and the work for her master's degree was completed in August 1916.

After receiving her master's degree, Hunt was an instructor of mathematics at Parsons College (now closed) in Fairfield, Iowa, 1916–17. She was professor of mathematics at Bessie Tift College (later Tift College, now closed), then a women's college in Forsyth, Georgia, 1918–22. Tift College records indicate that she also taught at Denison at some point, perhaps in 1917–18. She resumed her graduate studies at Chicago, wrote her dissertation under Dickson, and received her PhD in 1924.

Hunt's thirty-year career at Illinois Wesleyan University, in Bloomington, Illinois, began in the fall of 1924. She joined the two-person department as assistant professor and was promoted to professor two years later, when the department's previous professor left. She was the senior member of the department, which consisted of two people until a few years before her retirement.

While at Illinois Wesleyan, Hunt served on various university committees and sometimes as freshman advisor. She was secretary of faculty in the College of Liberal Arts after 1931 and assumed a major administrative position when she became registrar of the university in 1943. She remained in both of these positions and continued as professor of mathematics until she retired in 1954 as professor emeritus. Until she became registrar Hunt regularly attended meetings of the Illinois Section of the MAA and served as vice chairman 1939–40 and chairman 1940–41.

After her retirement, Mildred Hunt moved to Lewisburg, Pennsylvania, to live with her family. Her death in 1975 at age eighty-seven in St. Petersburg, Florida, came after a lengthy illness.

Organizational affiliations: AMS, MAA, AAAS, Phi Beta Kappa.

Thesis and dissertation:
1916 Fundamental systems of polynomial and single valued invariants of conic forms under rotations and translations. MA thesis, University of Chicago, directed by Leonard Eugene Dickson. Typescript.
1924 The arithmetics of certain linear algebras. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series.* 2:5–10.

References to: AmMSc 8, 9P.
"Dr. Mildred Hunt Dies–Taught at IWU." *Bloomington-Normal* (*IL*) *Pantagraph*, 16 Dec 1975.

Other sources: Master's thesis biographical sketch 1916; application for social security number 1951; Illinois Wesleyan University Archives; communications with Hillsdale College Archives and with Mercer College Special Collections (Tift College Archives); US Census 1900, 1910 OH, 1930 IL.

Last modified: December 11, 2008.

HUSTON, Antoinette (Killen). November 23, 1904–July 13, 1993.
University of Chicago (BS 1926, MS 1930, PhD 1934).

Antoinette Marie Killen was born in Chicago, Illinois, the daughter of Anna (Harrold) (ca. 1876–1939) and Mark Henry Killen (1877–1945). Her parents were born in Indiana. In 1910 they were living in Hyde Park in Chicago, and Mark Killen was a groceries salesman. In 1930 the three were living in the Colonial Hotel in Hyde Park, and her father was a lumber salesman. At the time of Anna Killen's death in May 1939, Mark Killen was described as treasurer of the Union Lumber Company of Delaware, located in Chicago.

Antoinette Killen received her elementary and secondary education in the Chicago public schools and graduated from Nicholas Senn High School on the north side of Chicago in 1923. She later credited a "very inspiring high school teacher" with enhancing her interest in mathematics (Smithsonian questionnaire 1985).

Killen entered the University of Chicago in the autumn of 1923. In a letter to one of the authors that was postmarked March 9, 1978, she described aspects of her university life.

> All I ever wanted to be was a high school math teacher. But after graduating from U of C in 1926 no such job opened up so I settled for becoming librarian in charge of the math-physics-astronomy library because Professor Moore wanted a librarian who knew a number theory book from a trig. text. In about the same way I advanced to become Prof. Bliss's girl Friday – he wanted someone who could spell "function" and other mathematical terms. I was a self taught typist – and learned speedwriting in five weeks to become his secretary. The job and life were pleasant. I took one course at a time, played bridge, danced and dated graduate students, and wrote a master's thesis under Lawrence Murray Graves. . . . I really did not dream of working toward the doctorate – but all of a sudden A. A. Albert told me I was going to work with him – he had attended to all the preliminaries such as getting me admitted to candidacy.

Killen had begun taking graduate courses in October 1927 and received her MS in 1930. She earned her PhD in 1934, having also served as assistant secretary to Gilbert Ames Bliss, who had become department chairman in 1928. While at Chicago she studied with Professors A. A. Albert, G. A. Bliss, L. E. Dickson, L. M. Graves, and Mayme Logsdon, among others; she was Albert's first doctoral student. In her March 1978 letter she "list[s] among [her] good friends" the following women who were mathematics graduate students at Chicago: Frances Baker, Julia Wells Bower, Abba Newton, Mina Rees, Ruth Mason Ballard, Anne Stafford Henriques, Emily Chandler Pixley, Beatrice L. Hagen, Aline Frink, and Virginia Haun McShane.

Having just received her doctorate in June, on July 14, 1934, Antoinette Killen married Ralph Ernest Huston, a fellow graduate student. Ralph Huston, born in Huntington, Indiana, on September 16, 1902, graduated from the high school in Kewanee, Illinois, and then from the University of Chicago in 1923, the year Antoinette Killen entered. After graduating from Chicago, Huston was at Merton College, Oxford, as a Rhodes scholar for three years, after which he earned a Bachelor of Arts

in the Final Honour School of English Language and Literature. The following year he studied at the University of Grenoble. After returning to the United States in 1927, he was, for two years, associate professor of modern languages at Southwestern (later Southwestern at Memphis) in Tennessee before entering the University of Chicago for graduate study in mathematics in the summer of 1929. He earned his PhD in 1932, having written his dissertation in number theory under the direction of L. E. Dickson. Ralph Huston had also taught as a departmental assistant at Chicago, as acting professor at Iowa State College, and in the Extension Division of Indiana University in northwestern Indiana. In 1932–33 he was professor and acting head of the department at Wesleyan College, a women's college in Macon, Georgia.

In 1934 Antoinette and Ralph Huston moved to Troy, New York, where Ralph Huston began a thirty-three year association with Renssalaer Polytechnic Institute: as instructor 1934–37, assistant professor 1937–43, associate professor 1943–48, professor 1949–67, and professor emeritus after 1967. In her 1978 letter, Antoinette Huston described her marriage as having launched her "on a new career– being a wife and mother of Peter, Kenneth, Richard, and T. Michael Huston." Their first child, Peter Eugene, was born on November 21, 1935; the second, Kenneth, on February 17, 1937. The two younger boys were born within the next few years. She also wrote that "when 'baby' Mike was able to make his own peanut butter sandwich – in 1955 – [she] joined the math Dept at RPI as Assistant P." She remained an assistant professor until 1967, the year Ralph Huston retired, when she was promoted to associate professor. Two years later, on October 8, 1969, Ralph Huston died. Antoinette Huston retired as associate professor emeritus in 1970. The Ralph Ernest Huston Prize was established in 1973 by Antoinette K. Huston and their sons. It is awarded at commencement to the first- or second-year graduate student in the Department of Mathematical Sciences at RPI who has demonstrated unusual promise and ability as a teacher.

Antoinette Huston assisted W. L. Duren, Jr., in the preparation of his article "Graduate student at Chicago in the twenties" that appeared in the *Monthly* in 1976. She was active in the League of Women Voters and was a member of the American Contract Bridge League. An avid duplicate bridge tournament player, she reported in 1978 that she "liked to play five or six times a week, and spend any spare moments reading books by bridge experts." Huston moved to Santa Fe, New Mexico, in the 1970s and died there in 1993 at age eighty-eight. She was survived by her four sons, four grandchildren, and one great-grandchild. She was buried in Huntington, Indiana, her husband's birthplace.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1930 [Killen, A. M.] An application of the Cauchy-Lipschitz method to a system of functional equations. MS thesis, University of Chicago, directed by Lawrence Murray Graves. Typescript.

1934 [Killen, A. M.] The integral bases of all quartic fields with a group of order eight. PhD dissertation, University of Chicago, directed by Abraham Adrian Albert. Typescript. Private edition, 1936, distributed by the University of Chicago Libraries.

References to: AmMSc 10P–11P; AmMWSc 12P–13P, 14; WhoAmW 6.
"Dr. Antoinette E. Huston." (Obituary) *Santa Fe New Mexican*, 15 Jul 1993.

Other sources: MS thesis vita 1930; PhD dissertation vita 1934; Owens questionnaire 1937; Owens Papers; personal correspondence with author 1978; Smithsonian questionnaire 1985; communication with Santa Fe Public Library; "Mrs. Anna Killen," (Obituary) *Chicago Daily Tribune*, 27 May 1939; WhAm 5 (Huston, Ralph Ernest); US Census 1910, 1930 IL.

Last modified: August 1, 2009.

INFELD, Helen (Schlauch). July 20, 1907–July 6, 1993.
New York University (BA 1928), Cornell University (MA 1929, PhD 1933).

Helen Mary Schlauch was born in the Bronx, in New York City, the third child of Margaret (Brosnahan) (1872–1947) and William Storb Schlauch (1873–1953). Her parents were born in Pennsylvania as were her older sister, Margaret (1898–1986), and brother, William H. (b. 1902). Her mother was born a Catholic and her father a Lutheran, but the children were raised with no religious affiliation. Her father earned a bachelor's degree from the University of Pennsylvania and a master's degree from Columbia University. He taught mathematics at the High School of Commerce in New York City and after 1929 was on the faculty of the School of Commerce, Accounts and Finance of New York University, from which he retired as professor emeritus in 1948. Her father served for many years as an associate editor of the official journal of the National Council of Teachers of Mathematics and held the title honorary president of that organization after his retirement.

Helen M. Schlauch graduated from high school in Hasbrouck Heights, New Jersey, in 1924. She then attended Washington Square College of New York University on a scholarship and graduated in 1928 with a major in mathematics and minors in English and psychology. At NYU she was a member of the women's honor society Eclectic and of the sorority Alpha Omicron Pi, serving as president of the Pan Hellenic Council her junior year. She also participated in the Dramatics Society 1924–28 and the Varsity Women's Debating Team 1925–28.

Following her graduation from NYU, Schlauch studied at Cornell University and received a master's degree in 1929. For the next several years, she was on the faculty at Hunter College in New York City and continued her graduate work at Columbia and Cornell. She was at Hunter as tutor 1929–31 and instructor 1931–32, while also taking a course yearly at Columbia during these years. During the summers of 1930 and 1931, she was registered for informal study at Cornell with Virgil Snyder.

In May 1932 Helen Schlauch married Leonard Palmer Adams (1906–2000), who was studying for a PhD in labor economics at Cornell. L. P. Adams had received his bachelor's degree from Alfred University in 1928 and his master's degree from Cornell in 1930. In June 1932 Helen Schlauch Adams returned to Cornell as a scholar and took her PhD examination in July 1933 with major geometry, first minor algebra, and second minor electricity. Her dissertation in algebraic geometry was done under Snyder's supervision. L. P. Adams was at Cornell through 1934. He was an instructor at Colgate University 1934–35, received his doctorate from Cornell in February 1935, and was a research associate at the Central States Board in Washington 1935–36. They were divorced in 1936; there were no children.

Helen Adams remained on the faculty of Hunter as an instructor 1931–41. At a 1938 meeting of the AMS, she met the Polish-born and -educated theoretical physicist, Leopold Infeld (1898–1968), who taught for eight years in Jewish secondary schools in Poland after receiving his PhD in 1921 from the University of Krakow. After five years at the University of Lwow (then in Poland, now Lviv, Ukraine) and a year as a Rockefeller Foundation fellow at Cambridge, England, he came to the Institute for Advanced Study in Princeton. When he met Helen Adams he had just published *The Evolution of Physics* with Albert Einstein and was about to go to Canada to teach at the University of Toronto on the applied mathematics faculty.

During 1938–39 he often traveled from Toronto to New York to see Helen Adams. They were married in New Jersey on April 12, 1939, and had two children, Eric S. (b. 1940) and Joan M. (b. 1943), both born in Toronto.

While on the applied mathematics faculty, and later the mathematics faculty, of the University of Toronto, Leopold Infeld actively campaigned against nuclear weapons. After spending the summer of 1949 in Warsaw, he announced that he wanted to spend 1950–51 in his native Poland lecturing at the University of Warsaw. Shortly thereafter he was accused of being an atomic spy. In May 1950 he left for Poland in a move that he later announced would be permanent; he resigned his professorship at Toronto in August 1950.

Leopold Infeld's description of this part of his life appears in his book *Why I Left Canada*, which was translated by Helen Infeld. He had described his earlier life in the Jewish ghetto of Krakow in *Quest: An Autobiography*, which was first published in 1941 and which appeared in a second edition in 1980. He was also the author of the 1948 fictional biography of Evariste Galois, *Whom the Gods Love*, and the 1950 *Albert Einstein, His Work and Its Influence on Our World*. In Warsaw Leopold Infeld became the director of the Theoretical Physics Institute and served in this position until his death in 1968. In Poland he was critical of censorship by the Polish government. In 1995 he was posthumously awarded the rank of professor emeritus from the University of Toronto.

Before the family emigrated to Poland, Helen Infeld served in various positions in the Ajax division of the University of Toronto. The Ajax campus was created from a massive munitions plant after the war to help accommodate the returning veterans and was in existence for three and a half years. She was both assistant and reader the first six months of 1946 followed by assistant 1946–47 and instructor 1947–49, after which the Ajax campus was closed and she was unemployed. At the end of 1948 she described her life in Canada to her master's thesis supervisor, Walter B. Carver, in a letter that is in an envelope pasted to the back cover of the archival copy of her 1929 master's thesis.

> I've gone back to work. After giving up one job to come to Toronto with Leopold, and getting two children beyond babyhood, I found myself with a wonderful opportunity to have what I'd always wanted. The returning veterans so increased the student body, that the Engineering School here took over a former defense plant and turned it into a college for the first two years of engineering – twenty miles from town. There I have been teaching Calculus for the past $3\frac{1}{2}$ years, while a very nice housekeeper kept things going at home. I teach part-time and am home several days a week – I see the children when they come in from play, and I'm having a wonderful time. The veterans are fine to work with, and most appreciative. (Cornell University Archives)

Helen Infeld sailed for Poland in July 1950, her first trip outside of North America. The following year her sister, Margaret, a linguist on the faculty of New York University, joined the Infelds in Poland and, as reported in her obituary in the *New York Times*, left the United States "saying she wished to avoid persecution for pro-Communist views." Margaret Schlauch served as professor and head of the English department of Warsaw University until 1967. The cold war atmosphere of

the 1950s caused the Canadian government to cancel the Infeld children's citizenship in December 1958 when they were fifteen and eighteen. Their daughter left Poland in 1974 and was living in Ontario, Canada, in the early 1990s. Their son, a professor of physics at the Solton Institute in Warsaw who was educated at Trinity College, Cambridge, and Warsaw University and who publishes under the name Eryk Infeld, spent some time at the Centre de recherches mathématiques of the Université de Montréal in the early 1990s.

Her son reported that Helen Infeld "faced the challenge of bringing up a family in a country that was completely new to her" and that "devotion to her family ... led to diminishing interest in mathematics (other than through her husband and son)" (authors' questionnaire 1991). Leopold Infeld had a heart condition and in 1959 suffered a stroke. Their son credits his father's survival to his mother's care.

In 1965–66 Helen and Leopold Infeld spent five months in the United States, living in Dallas, Texas, while Leopold Infeld was a visiting professor at the Southwest Center for Advanced Studies (now part of the University of Texas at Dallas). They then returned to Poland. After Leopold Infeld's death in 1968, and until 1982, Helen Infeld served as editor of *Poland (A Monthly)*, the English-language version of a periodical devoted to cultural events in Poland.

Helen Infeld was a member of the Polish-Icelandic Society. She received Poland's Gold Cross of Merit in 1954 and in 1970 the Chevalier Cross, Polonia Restituta, one of the highest distinctions awarded by the Polish government. She died in Warsaw in 1993 shortly before her eighty-sixth birthday. Her funeral was held at the Powazki municipal cemetery.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Pi Mu Epsilon.

Thesis and dissertation:

1929 [Schlauch, H. M.] Mixed systems of linear equations and inequalities. MA thesis, Cornell University, directed by Walter Buckingham Carver. Typescript. See also **1932**.

1933 [Adams, H. S.] On the normal rational n-ic. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed abstract, 1936, reprinted from *Bull. Amer. Math. Soc.* 42:441–48.

Publications:

1931 [Schlauch, H. M.] Point-college: A mathematical collegiate farce concerning analytics in which the student body is composed of animated points. *Sch. Sci. Math.* 31:448–54.

1932 [Schlauch, H. M.] Mixed systems of linear equations and inequalities. *Amer. Math. Monthly* 39:218–22. Published version of MA thesis. Review: *JFM* 58.0099.01 (G. Anders). Presented to the AMS, Bethlehem, PA, 27 Dec 1929; abstract: *Bull. Amer. Math. Soc.* 36:198 #116.

1936 [Adams, H. S.] On the normal rational n-ic. *Bull. Amer. Math. Soc.* 42:441–48. Abstract of PhD dissertation. Reviews: *JFM* 62.0764.02 (R. Weitzenböck); *Zbl* 014.17503 (J. Todd).

1939 Review of *General Mathematics*, by C. H. Currier, E. E. Watson, and J. S. Frame. *Amer. Math. Monthly* 46:443.

1978 (Translator from the Polish) *Why I Left Canada: Reflections on Science and Politics* by L. Infeld. Edited with an introduction by L. Pyenson. Montreal: McGill-Queen's Univ. Press. Reviews: *Amer. Math. Monthly* 86:139 (L. A. Steen); *Science* 204 (4388): 49–50 (M. Kac); *Isis* 70:638 (L. Badash).

1979 Remembering my husband Leopold Infeld. *Poland (A Monthly).*

References to: AmMSc 6–8.

Infeld, Eryk. "Biography." In *Leopold Infeld: His Life and Scientific Work* edited by E. Infeld. Warszawa: Polish Scientific Publishers, 1978.

Other sources: PhD dissertation biography 1933; Owens questionnaire 1937; authors' questionnaire completed by son 1991; Division of Rare and Manuscript Collections, Cornell University Library; Former Members of the Department files, Cornell University Department of Mathematics; University of Toronto Archives; "Margaret Schlauch, 88; American Expatriate," *New York Times*, 23 July 1986; Susan Bloch-Nevitte, "Closing the circle," *University of Toronto News*, 29 May 1995; WhAm 4 (Infeld, Leopold); US Census 1920, 1930 NJ.

Last modified: June 23, 2011.

JACKSON, Rosa L. May 7, 1883–January 15, 1967.
Western College for Women (BA 1904), University of Chicago (MS 1922, PhD 1928).

Rosa Lea Jackson was the daughter of Mary Thom (Palmer) (b. ca. 1853) and James Knox Polk Jackson (1842–1925), natives of Tennessee. Her father was a farmer. There were four children in the family: a son, Hugh, born in about 1871, and three daughters, Willie Kate (1872–1943), Julia M. (1877–1963), and Rosa Lea. Her father was widowed by 1900. Rosa Lea Jackson attended public elementary and secondary schools in Ripley, Tennessee, where she was born.

Jackson entered The Western, a College and Seminary for Women, in Oxford, Ohio, in 1900. After her graduation in 1904 from the renamed Western College for Women, she was at Athens Female College (now Athens State University) in Alabama until 1910, as head of the mathematics department 1904–07 and as dean and professor of mathematics 1907–10.

In 1910–11 and summer 1911 she attended the University of Chicago as a graduate student in mathematics. The following academic year she taught history and was dean at Central College for Women in Lexington, Missouri, after which she taught at Ripley High School in her home town in Tennessee 1912–14 and was an acting adjunct professor at Randolph-Macon Woman's College 1914–16. She returned to Athens College as professor of mathematics and dean from 1916 to 1921. She was also head of the department when she joined the MAA in 1920. Some of the time she was at Athens College, her sister Julia was a professor of history and the registrar there.

In 1921–22 Rosa L. Jackson again attended the University of Chicago full time; she wrote her thesis in the calculus of variations and received her master's degree in 1922. She was instructor at Northwestern University from 1922 until 1926 and attended the University of Chicago in the summers of 1925 and 1926. She continued at Chicago during the academic year 1926–27, as a fellow, and in summer 1927. In 1927–28 she was instructor in mathematics at Leland Stanford Junior University, where her teaching schedule was listed as analytic geometry, differential and integral calculus, complex variables, calculus of variations, and a directed reading. She also finished her dissertation in calculus of variations and received her PhD from the University of Chicago in August 1928.

After receiving her doctorate, Jackson was an instructor at Hunter College from 1928 to 1930, following which she was instructor in the women's division of the newly opened Brooklyn College 1930–31. In 1931 she joined the faculty at Alabama College, State College for Women (now the University of Montevallo) in Montevallo, Alabama, where she remained as professor and head of the mathematics department until she retired as professor emeritus in 1959, when she was nearly seventy-six. The school had become coeducational in 1956.

Jackson regularly attended meetings of the Southeastern Section of the MAA in the 1930s; she continued attending, although more sporadically, through at least 1950. In 1937 Alabama College started a chapter of the mathematics honorary fraternity Kappa Mu Epsilon, and Rosa Lea Jackson served as corresponding secretary of the chapter at least from 1950 until 1952.

Eight years after her retirement, Rosa Lea Jackson died in Selma, Alabama, of a coronary occlusion due to arteriosclerotic heart disease. She was buried in Maplewood Cemetery in her hometown of Ripley, Tennessee.

Organizational affiliations: AMS, MAA, NCTM, Kappa Mu Epsilon.

Thesis and dissertation:
1922 A problem in the calculus of variations involving second derivatives. MS thesis, University of Chicago, directed by Gilbert Ames Bliss. Typescript.
1928 The boundary value problem of the second variation for parametric problems in the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series.* 7:19–24.

Publication:
1930 Review of *The History and Significance of Certain Standard Problems in Algebra*, by V. Sanford. *Amer. Math. Monthly* 37:445–46.

References to: AmMSc 7–8, 9P–11P.

Other sources: MS thesis vita 1922; PhD dissertation vita 1928; Owens questionnaires 1937, 1940; Brooklyn College Archives; Hunter College Archives; Stanford University Archives; Western College Archives; communications with Athens College Archives and with Western College Alumnae Association; US Census 1880, 1900, 1910 TN; Alabama death certificate.

Last modified: March 26, 2008.

JOHNSON, Roberta F. January 22, 1902–October 12, 1988.
Wilson College (BA 1925), Cornell University (MA 1931, PhD 1933).

Roberta Frances Johnson was born in Philadelphia, Pennsylvania, the daughter of Mary Wallace (Abdill) (1874–1918) and Jesse B. Johnson (1875–1936). Her mother was born in New Jersey, her father in Philadelphia. Her parents were educated through grade school and married in about 1895. Johnson later described her mother as a homemaker and her father as a mechanic; census records describe his occupation as machinist. A sibling born before 1900 was not living in 1900. A younger sister, Lillian, born about 1907, died at age three.

Roberta Frances Johnson attended Frankford High School in Philadelphia before enrolling at Wilson College, a women's college in Chambersburg, Pennsylvania. At Wilson she was a member of a literary club, the science club, and the international relations club and was president of the latter her senior year. Upon graduation from Wilson in 1925 with departmental honors in mathematics and a minor in history, she remained in Chambersburg three years, 1925–28, to teach mathematics at the Chambersburg high school. She taught mathematics and history for the next two years in the high school in Newfoundland, Pennsylvania.

Johnson attended summer sessions at Cornell University during 1929 and 1930. She remained at Cornell in the fall of 1930 and enrolled with a fellowship from Wilson College intending to major in mathematics and minor in modern European history. In February 1931 she received her master's degree with both her major and minor in mathematics. She retained the fellowship from Wilson during her three years at Cornell and also held an Erastus Brooks fellowship her second year there. After a third year of study at Cornell, with major subject geometry, first minor analysis, and second minor philosophy, she received her doctorate in 1933 with a dissertation in algebraic geometry directed by Virgil Snyder. Her published dissertation, **1934**, was described by Snyder in a review of a French monograph as "an excellent introduction to this memoir" (*Bull. Amer. Math. Soc.* 41 (1935): 170).

Johnson had expected to remain at Cornell 1933–34 as a "resident doctor" in order to continue her research. However, the head of the mathematics department at Wilson became ill, and Johnson was to substitute for at least a month beginning in September. When the head took a leave of absence, Johnson remained for the academic year 1933–34 on a temporary appointment. Johnson taught at Wilson for twenty-five years. She was an instructor 1934–35, assistant professor 1935–44, and associate professor after 1944. During this time she taught all of the undergraduate courses and honors courses. She was acting head of the department second semester 1944–45 and became department head in 1946 when the previous chairman retired.

After receiving her doctorate, Johnson stayed active in the mathematical community. She attended many local and national meetings of the American Mathematical Society in the eastern United States, from Durham, North Carolina, north to Providence, Rhode Island. In 1951 she served as a referee for one of the AMS publications. During the summer of 1957, Johnson participated in a summer institute in social sciences for college mathematics teachers at Stanford University. While at the institute she asked for a letter of recommendation from Robert J. Walker, a Cornell faculty member whom she had seen at meetings of the American Mathematical Society. She wrote, "This spring I decided, after 24 years at

Wilson College to make a change. This has not been an easy decision to reach–it should have been made twelve years ago when the former head retired. Unfortunately those of us who launched our careers in the midst of the depression have a false notion about security. Also, this will be my first experience in job hunting. Previously the job or fellowship hunted me" (Cornell University, Department of Mathematics files). She continued, "I am prepared to adjust to a new pattern of work and I expect to follow rather than lead in a new position. If necessary, I am ready to leave the teaching field but I believe that I have the most to contribute in an academic position. However, I definitely desire to move to a co-educational institution.... I shall not bore you with the details of my reasons for this decision. My fellow faculty members will view it as a refusal to accept the injustice of being passed over when promotions are made. It is not that alone. I need a change ..." In a letter the following spring, she wrote that Wilson found out about her search, and she received a promotion to full professor and a tenure contract. However, she continued to look for a new position.

In 1958 Johnson moved to Fort Collins, Colorado, as an associate professor at Colorado State University. While there she directed the theses of about eight master's students. Johnson remained at Colorado State until her retirement as associate professor emeritus in 1967. The following spring the University of Colorado announced her appointment as an associate professor, and she taught at the University of Colorado at Denver for three years after her retirement.

Johnson indicated in 1985 that she was a Presbyterian until 1925 and had no religious affiliation after that. In summer 1936 she was in Ann Arbor as a reader for the College Entrance Board; in September of that year she traveled to Bermuda. During World War II, she did sewing for the Red Cross. She was also a member of a Wilson College alumnae club. In the mid-1980s she listed reading as a hobby.

Roberta Johnson died of bone cancer in 1988 at age eighty-six at her home in Fort Collins. During her illness she was cared for by friends and by a local hospice organization, to which she bequeathed her house. Her remaining assets were given to the Fort Collins public library. She was cremated and had requested that there be no memorial service.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, Phi Beta Kappa, Phi Kappa Phi, Sigma Xi.

Thesis and dissertation:

1931 Certain properties and a classification of nets of conics. MA thesis, Cornell University, directed by Virgil Snyder. Typescript.

1933 Involutions of order 2 associated with surfaces of genera $p_a = p_g = 0$, $P_2 = 1$, $P_3 = 0$. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1934, reprinted from *Amer. J. Math.* 56:199–213.

Publications:

1934 Involutions of order two associated with surfaces of genera $p_a = p_g = 0$, $P_2 = 1$, $P_3 = 0 \ldots$ *Amer. J. Math.* 56:199–213. Published version of PhD dissertation. Reviews: *JFM* 60.0581.01 (O. H. Keller); *Zbl* 009.03502 (E. G. Togliatti).

1936 Review of *Leibniz et les démonstrations mathématiques de l'existence de Dieu*, by J. Iwanicki. *Scripta Math.* 4:169–72.

1938 Review of *Morin et les démonstrations mathématiques de l'existence de Dieu*, by J. Iwanicki. *Scripta Math.* 5:132–34.

1939 Review of *Procedures and Metaphysics: A Study in the Philosophy of Mathematical-Physical Science in the Sixteenth and Seventeenth Centuries*, by E. W. Strong. *Scripta Math.* 6:235–37.
1940a Review of *Tables for Converting Rectangular to Polar Coordinates*, by J. C. P. Miller. *Amer. Math. Monthly* 47:103.
1940b Review of *Textes Mathématiques Babyloniens*, edited and translated by F. Thureau-Dangin. *Amer. Math. Monthly* 47:651–52.
1943 Review of *Basic College Mathematics: A General Introduction*, by C. W. Munshower and J. F. Wardwell. *Amer. Math. Monthly* 50:450.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P.
"Roberta F. Johnson." (Obituary) *Fort Collins Coloradoan*, 14 Oct 1988.
"Roberta F. Johnson '25, Wilson Professor of Mathematics." (Obituary) *Wilson College Alumnae Quarterly*, Spring 1989.

Other sources: PhD dissertation biography 1933; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1985; Division of Rare and Manuscript Collections, Cornell University Library; Former Members of the Department files, Cornell University Department of Mathematics; communications with Main Library of the Fort Collins Regional Library District and with Wilson College Archives; US Census 1900, 1910, 1920, 1930 PA; SSDI.

Last modified: July 20, 2009.

KANARIK, Rosella (Kanarik). February 7, 1909–April 19, 2014.
University of Pittsburgh (BA 1930, MA 1931, PhD 1934).

Rosella Kanarik was born in Bartfa, Hungary, the elder of two children of Sarah (Schondorf) (1886–1961) and Albert Kanarik (1874–1960), both of Bartfa. Her mother had an elementary school education and was a housewife; her father had some high school and was in business. At one point he was in the clothing business and later, in 1930, was proprietor of a restaurant. He had immigrated to the United States early in the twentieth century and then apparently returned to Hungary, where her parents were married in November 1907. Her father returned to the US in July 1912, and she and her mother arrived in September 1913. Her younger brother, Edgar, born in Pittsburgh in 1926, later earned a bachelor's degree from the University of California at Los Angeles and became a high school teacher, realtor, and investor.

Kanarik wrote that when she was taking her first course in algebra in the ninth grade, she "fell in love with mathematics." Her teacher, Kenneth Clark, "made the subject matter absorbing and challenging, especially word problems–the harder the better. From then on [she] was a mathematics major" (Smithsonian questionnaire 1985). She attended public high schools, first Wadleigh High School in New York City 1923–25 and then the Fifth Avenue High School in Pittsburgh, from which she graduated with highest honor in 1926.

Kanarik attended the University of Pittsburgh, where she has written that she "was most fortunate to have Dr. Montgomery Culver as [her] calculus professor. Not only did he make mathematics fascinating, he also took personal interest in his students." She wrote, "He inspired me and motivated me to go on to do graduate work" (Smithsonian questionnaire 1985). She received her BA degree as a student in the School of Education with high honor in 1930. She had a graduate scholarship at Pittsburgh 1930–34, was an assistant in mathematics 1931–33, and taught at Schenley Evening High School at least from 1931 until 1934. She received her master's degree in 1931 and her PhD with distinction in 1934. Culver, who had received his own doctorate from Pittsburgh in 1927, directed her dissertation.

Kanarik wrote in 1985, "I graduated during the depression. It was almost impossible for anyone, let alone a woman, to find a position in industry, college, or university. I was lucky to get into a high school to teach mathematics." It appears that she taught some at the university, although not in a regular position, and in a high school in Pittsburgh 1932–36.

On July 25, 1936, Rosella Kanarik and Emery Kanarik, her cousin, were married. Emery Kanarik was born in 1909 in Bardejov Spa, Czechoslovakia, attended the College of the City of New York 1926–28, and earned a Bachelor of Architecture degree in 1932 after studying at the Columbia University School of Architecture. Later he was president of the architectural firm Emery Kanarik and Associates, organized in 1952 in California.

The Kanariks had two children, Richard, born in 1937, and Susan Carol, born in 1940, both in Los Angeles. Rosella Kanarik taught in high schools in Los Angeles 1939–46. "In 1946 when there was a great need for mathematics instructors, I was hired as a lecturer at the University of Southern California," she wrote in 1985. She remained in that position until 1952 and while there taught courses at all levels,

from college algebra through a graduate course in analysis. She also taught at a high school in Los Angeles 1951–53, and in 1953 was hired as the first woman member of the mathematics department at Los Angeles City College. She spent the rest of her career there, as instructor 1953–61, associate professor 1961–67, professor 1967–74, and professor emeritus after 1974. She also served as counselor 1956–62. She remarked that she would never have retired if it had not been mandatory when she became sixty-five.

After her retirement Kanarik was a member of various retired teacher organizations and did volunteer work tutoring high school and college students in mathematics. She wrote that it is a labor of love, for she loved teaching at any level. She was also a member of the UCLA Affiliates, the Los Angeles Women's Architectural League, the Brandeis University National Women's Committee, and Pioneer Women. Kanarik was Jewish and a Democrat and enjoyed traveling, theatre, reading, playing bridge, and cooking. Emery Kanarik died in 1992, and Rosella Kanarik continued to live in Los Angeles. During her lifetime the Los Angeles City College mathematics department awarded the Rosella Kanarik scholarship annually and its listing on the Los Angeles City College Foundation website included the statement that "This merit-based scholarship was created by a generous donation from Dr. Rosella Kanarik." The scholarship continues to be awarded, but no longer on a regular schedule.

Rosella Kanarik died at home on April 19, 2014, at age 105, the longest lived American woman with a pre-1940 PhD in mathematics. Funeral services were held at Mount Sinai Memorial Park in Los Angeles. She was survived by her two children, a grandchild, a great-grandchild, and her brother.

Organizational affiliations: AMS, MAA, NCTM, Sigma Xi.

Thesis and dissertation:
1931 On solutions of Laplace's equation with four independent variables. MA thesis, University of Pittsburgh. Abstract: *Abstr. of Theses, Res. in Prog., and Bibliog. of Publ.* 7:379–81.
1934 Fundamental regions in S_4 for the Hessian group. PhD dissertation, University of Pittsburgh, directed by Montgomery Morton Culver. Abstract: *Abstr. of Theses, Res. in Prog., and Bibliog. of Publ.* 10:194–200. See also abstract **1934**.

Abstract not listed above:
1934 Fundamental regions in S_4 for the Hessian group. *Bull. Amer. Math. Soc.* 40:803 #346. Presented to the AMS, Pittsburgh, PA, 27 Dec 1934.

References to: AmMSc 8, 9P–11P; AmMWSc 12P–13P, 14–24; WhoAmW 4–9.
"Rosella Kanarik." (Obituary) *Los Angeles Times*, 22 Apr 2014.

Other sources: Smithsonian questionnaire 1985; communications with Los Angles City College Library, Los Angeles City College Mathematics Department, and University of Pittsburgh Archives; Ellis Island Oral History Project, Series DP, no. 29: Interview of Emery Kanarik by Andrew Phillips, May 24, 1989; AmArch 3 (Kanarik, Emery); US Census 1930 PA; SSDI.

Last modified: January 18, 2016.

KARL, Sister Mary Cordia. November 16, 1893–August 30, 1984.
Hunter College (BA 1916), Johns Hopkins University (MA 1927, PhD 1931).

Elizabeth E. Mary Karl was born in New York City, the eldest of four children of Mary Anna (Klarmann) (b. 1866) and Edward Philip Karl (b. 1865), both born in New York of German parents. Her father was an office clerk. In 1900 the family was living in the Bronx, and her parents had been married eight years. At that time there were three children: Elizabeth; Mary [Marie] (b. 1897), and Nicholas (b. 1899). Their daughter Frances was born in about 1901.

Elizabeth Karl attended Immaculate Conception School for eight years and then Normal College High School (later Hunter College High School) 1908–12. After her high school graduation she attended Hunter College, from which she graduated second in her class in January 1916 with a major in mathematics and minors in astronomy and physics. The lighthearted description of her in her college yearbook noted that "in spite of many years spent in this Institution of Learning, Elizabeth has not overcome her primitive fondness for folk-dancing. We think the reason is that she never tried" (Wisterion 1916, 30). It was later reported that she hoped to become a nun after graduation but that her father objected strongly. Karl taught in the New York City schools until 1918. She taught algebra and English at William Cullen Bryant High School in Long Island City, Queens, February 1916–February 1917; mathematics at Blessed Sacrament Academy in Manhattan February 1916–June 1917; and third grade at Public School 46 in the Bronx 1917–18.

In 1918 Elizabeth Karl entered the Order of the School Sisters of Notre Dame, whose motherhouse is in Baltimore, and took the name Mary Cordia. For most of the time from 1918 until her retirement in 1965, Sister Mary Cordia Karl was associated with the College of Notre Dame of Maryland, in Baltimore, a Roman Catholic women's college, which was established in 1873 and which granted its first bachelor's degree in 1899. She taught mathematics and education at the college 1918–20; mathematics, science, Latin, and history at Notre Dame High School in Baltimore, 1920–22; and mathematics and physics at the College of Notre Dame after September 1922.

In 1920 a chapter of Phi Beta Kappa was established at Hunter College, and the following year Sister Mary Cordia Karl was offered membership by the new chapter. However, as a novice she was unable to accept the invitation. In 1948 her election was reaffirmed and was announced by the Hunter College chapter president, Jewell Hughes Bushey.

During most of the period from 1923 until 1931 Sister Mary Cordia was engaged in graduate work: in summer 1923 she studied at Fordham University; in fall 1923 she entered Johns Hopkins University, where she studied, usually part time, most of the next eight years. She took courses in physics in 1923–24, chemistry in 1924–25, and chemistry and mathematics in 1925–26. She also studied during the summers of 1925 and 1926 and during the academic year 1926–27. In June of 1927 she received a master's degree, based on her course work and on a master's essay on finite differences. She resumed her graduate work at Johns Hopkins in 1929 and finished her work for the PhD in 1931 with a dissertation, in which she used methods of projective geometry to recast a theory of orthopoles, written under the direction of Oscar Zariski, who had arrived at Johns Hopkins from Rome four years earlier and

who was not until some years later to introduce abstract algebra so decisively into his algebraic geometry.

Sister Cordia became head of the mathematics department at the College of Notre Dame in 1922, and in 1939 she hired one of her former students, Mary Varnhorn, to teach there. Karl remained as head of the department until 1965. She was also the religious leader of the nuns at the college from 1959 to 1965. It appears that in 1964–65 she was not teaching but served as coordinator of the science building planning project. After her retirement in September 1965 she moved to the Notre Dame Preparatory School in Towson, Maryland, where she taught and served as financial officer and then as administrative assistant until her second retirement in 1982. Later she lived at Villa Assumpta and the Maria Health Care Center for retired and ill sisters.

Sister Mary Cordia Karl died at St. Joseph Hospital in Baltimore at age ninety in August 1984. In 1994 the first of the Sister Cordia Karl Mathematics Awards was conferred by the faculty of the mathematics department on an outstanding mathematics student. In 2004 an award was made by the National Science Foundation to fund a four-year program, The Cordia Karl Scholars Program, to support students studying computer science, computer information systems, engineering, or mathematics at the College of Notre Dame of Maryland.

Organizational affiliations: AMS, MAA, NCTM, Phi Beta Kappa.

Thesis and dissertation:
1927 A problem in finite differences. MA thesis, Johns Hopkins University. Typescript.
1931 The projective theory of orthopoles. PhD dissertation, Johns Hopkins University, directed by Oscar Zariski. Typescript. Printed version, 1932, reprinted from *Amer. Math. Monthly* 39:327–38.

Publication:
1932 The projective theory of orthopoles. *Amer. Math. Monthly* 39:327–38. Published version of PhD dissertation. Reviews: *JFM* 58.0652.02 (A. Boy); *Zbl* 004.36107 (R. Moufang).

References to: AmMSc 7–8, 9P–11P; WhoAmW 8.
"Sister Mary Cordia Karl, Notre Dame Math Professor." (Obituary) *Baltimore Morning Sun*, 4 Sep 1984.
"Sister Mary Cordia, 90, Professor." (Obituary) *Baltimore Sun*, 4 Sep 1984.
"Sr. Mary Cordia, Mathematician, Dies." *Catholic Review*, n.d.

Other sources: MA thesis vita 1927; PhD dissertation vita 1931; Owens questionnaire 1937; Owens Papers; Johns Hopkins University Archives; communication with College of Notre Dame of Maryland Archives; *The Wisterion*, New York: Junior Class of Hunter College, 1916; "Phi Beta Kappa Unit Picks 50 at Hunter," *New York Times*, 28 Apr 1948; US census 1900, 1910, 1920, 1930 NY, 1930 MD.

Last modified: March 7, 2009.

KELLEY, Sister Mary Gervase. September 8, 1888–October 22, 1926.
Catholic University of America (Catholic Sisters College) (BA 1914, MA 1915, PhD 1917).

Helen Agnes Kelley was born in the Roxbury neighborhood of Boston, Massachusetts, the daughter of Mary (Callahan) (b. 1853) and John P. Kelley (b. 1848). According to the 1900 census, her parents were born in Massachusetts of Irish heritage. At that time her parents had been married sixteen years; the four surviving children of five born were: John A. (b. 1886), Helen, Mary E. (b. 1890), and William G. (b. 1891). John Kelley, her father, was a plumber. Some records report the last name as Kelly instead of Kelley.

Helen Kelley received her elementary education in St. Patrick's parochial school and graduated from St. Patrick's high school in Roxbury in 1905 . She entered the community of the Sisters of Charity of St. Vincent de Paul, Halifax, Nova Scotia, on August 5, 1906, took her first vows on November 1, 1908, and her final vows on August 15, 1915. She used the religious name Sister Mary Gervase.

Community records were destroyed in a fire in 1951, so much of the information about Sister Mary Gervase is based on material that was reconstructed after the fire. According to these records, Sister Mary Gervase was a teacher in schools run by her religious community; she earned her "B" License in 1908 and her "A" License in 1912. According to her dissertation vita, "in 1910 she began work with the University of London, from which institution she received the Matriculation and the Intermediate Arts certificates."

It appears that Sister Mary Gervase was assigned to St. Mary's in Halifax 1908–13, to St. Patrick's in Roxbury, Massachusetts, 1913–17, and to Mount St. Vincent in Rockingham, Nova Scotia, 1917–23. In all of these assignments she was either a teacher or a student.

From 1908 to 1913, Sister Mary Gervase taught in Halifax public schools. From 1913 to 1917, including summer sessions, she was a student in residence at the Catholic Sisters College of the Catholic University of America, where she earned a BA in 1914, an MA in 1915, and a PhD in 1917. Her PhD was the first in mathematics earned by a woman religious in the United States; the next was awarded a dozen years later, also by Catholic University, to Sister Marie Cecilia Mangold. Sister Mary Gervase's degree was one of the first two PhD's in mathematics awarded by Catholic University. Both she and J. N. Rice earned degrees in June 1917 under the direction of Aubrey Landry, and both of their dissertations are available in the University of Michigan Historical Mathematics Collection. While Sister Mary Gervase returned to Nova Scotia after receiving her doctorate, Rice joined the mathematics faculty at Catholic and remained there about forty years.

Sister Mary Gervase was a teacher at Mount St. Vincent Academy in Rockingham, Nova Scotia, from 1917 until 1923. In 1923 she entered the Lourdes Sanatorium in Stellarton, Nova Scotia, as a patient. This tuberculosis sanatorium had been opened by the Sisters of Charity just over a decade earlier. Sister Mary Gervase remained there until her death at age thirty-eight in 1926. She was survived by her mother and at least one sister and one brother.

Dissertation:
1917 On the cardioids fulfilling certain assigned conditions. PhD dissertation, Catholic Sisters College of the Catholic University of America, directed by Aubrey Edward Landry. Printed by National Capital Press, Washington, DC. Online at University of Michigan Historical Mathematics Collection.

References to: BioWMath.
Obituary. *Halifax Herald*, 23 Oct 1926.

Other sources: PhD dissertation vita 1917; Owens questionnaire 1940 (preparer unknown); communication with Mount Saint Vincent, Sisters of Charity of St. Vincent de Paul, via Miriam P. Cooney, CSC; US Census 1900, 1910 MA.

Last modified: January 16, 2016.

KENDALL, Claribel. January 23, 1889–April 17, 1965.
University of Colorado (BA 1912, BEd 1912, MA 1914), University of Chicago (PhD 1921).

Claribel Kendall was born in Denver, Colorado, the daughter of Emma Gano (Reily) (b. 1859) and Charles Martin Kendall (1860–1906). The 1900 census indicates that both of her parents were born in Ohio and that her father was a lawyer. However, later census reports show her father as having been born in New York State, and that is confirmed by additional information. He graduated from Yale University in 1883 before moving to Colorado, where he married in 1887. In 1900 Claribel Kendall had one living sister, Florence (1890–1971); another sibling had died earlier. Emma Kendall, a widow, and her two daughters moved from Denver to Boulder in about 1910. According to census records, Claribel and her mother were living together in 1920 and 1930.

Claribel Kendall received both her elementary and secondary education in the Denver public schools. She entered the University of Colorado in Boulder in 1907 and earned both a bachelor of arts and a bachelor of education degree in 1912. It appears that she taught in public school at least a year before her graduation, most likely in 1908–09. During 1911–13, her senior year and her first year as a graduate student, she was an assistant in mathematics at Colorado. She became an instructor in 1913, one year before earning her master's degree in mathematics, having studied with Saul Epsteen and Ira M. DeLong. After receiving her master's degree, Kendall did graduate work at Colorado during the summers with visiting faculty Abraham Cohen and B. F. Finkel. During the summers of 1915 and 1918 and from the summer of 1920 to the summer of 1921 she studied at the University of Chicago with G. A. Bliss, L. E. Dickson, E. H. Moore, and E. J. Wilczynski. During her first two summers she had scholarships; during her extended period of residence she had a fellowship. She received her PhD from Chicago in September 1921.

Claribel Kendall's sister, Florence, entered the University of Colorado in 1909. She received a bachelor's degree in physics in 1913, after which she was an instructor of mathematics at the university for at least a year. Later, in 1926, she received a master's degree in mathematics from Colorado with a thesis, "The problem of two and three bodies in celestial mechanics." She was a high school teacher in Salida, Colorado, in 1920 before moving to Trinidad, Colorado, where she spent most of her career as a high school mathematics teacher.

Claribel Kendall remained at the University of Colorado for her entire career except for 1920–21, the year she had a leave to study at Chicago, and the summer of 1925, when she taught at the University of California. She was promoted from instructor to assistant professor in 1922, to associate professor in 1928, and to professor in 1943, and was the first woman to become a professor of mathematics at Colorado. She served as acting chairman of the department 1954–55. She retired in 1957 as professor emeritus.

In 1913, a year before she received her master's degree, a problem contributed by Kendall on calculus was published in the *American Mathematical Monthly*. A few years later, during 1916 and 1917, several of her solutions to problems in the *Monthly* were also published. In 1916 she was listed as a charter member of the MAA, and the following year she was one of fifteen MAA members to attend a meeting to organize

the Rocky Mountain Section of the MAA. During the summer of 1928, Kendall and her sister attended the International Congress of Mathematicians in Bologna, where Claribel Kendall was a delegate from the university. Kendall directed the master's theses of nine or ten students; one, in 1924, when she was an assistant professor is not certain since the department did not list master's advisors until 1928. After that time she advised three as an associate professor and six as a professor, the last one in 1955, two years before her retirement. Among these advisees were at least six women. In addition to her work in the mathematics department, Kendall was active on various committees in the university. Her obituary lists her service as secretary of the College of Arts and Sciences committee with power to act on degrees, her chairmanship of the Bigelow scholarship committee, her work with the Associated Women Students (AWS) as secretary of their loan and scholarship committee, and her serving as advisor to the AWS senate, Mortar Board, and the university Christian Science group.

Kendall was a member of Kappa Delta Pi, an education honorary society. She was active in the MAA through its Rocky Mountain Section and was president in 1930. She presented papers at meetings of the section in the period 1922–42; they included several expository papers and the master's thesis of one of her students. She was secretary of the Alpha of Colorado chapter of Phi Beta Kappa 1922–64, and a scholarship in her honor was established by the chapter. She was also secretary, as well as treasurer and president, of the Colorado Mountain Club. She also had an interest in bird watching, and at least twice in the 1920s she helped compile the Boulder Christmas bird census for the Audubon journal, *Bird-Lore*. She held various offices, including second reader 1944–47, in the First Church of Christ, Scientist, in Boulder.

Claribel Kendall was joined in her home in Boulder by her sister, Florence, after Florence retired in 1956. This was the same residence Claribel had shared with her mother at the time of the 1930 census. The sisters remained in their home in Boulder after Claribel Kendall's retirement in 1957. Claribel and Florence Kendall both served on the hospitality and recreation committee for the NCTM summer meeting in Greeley, Colorado, in August 1958.

Claribel Kendall died in 1965 at age seventy-six in Boulder. Both her local Phi Beta Kappa chapter and her local church were remembered generously in her will. Florence Kendall was eighty when she died in 1971, and contributions in her memory were requested to be sent to the Claribel Kendall Memorial Fund, in care of Phi Beta Kappa at the University of Colorado.

Organizational affiliations: AMS, MAA (charter member), NCTM, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1914 Preassociative syzygies in linear algebra. MA thesis, University of Colorado.

1921 Congruences determined by a given surface. PhD dissertation, University of Chicago, directed by Ernest Julius Wilczynski. Private edition, 1923, distributed by the University of Chicago Libraries, reprinted from *Amer. J. Math.* 45:25–41.

Publication:

1923 Congruences determined by a given surface. *Amer. J. Math.* 45:25–41. Published version of PhD dissertation. Reviews: *JFM* 49.0519.01 (M. Langally); *Rev. semestr. publ. math.* 31, pt. 1: 2–3 (E. B. Cowley). Presented as "Certain congruences determined by a given surface" to the AMS, St. Louis, MO, 26 Nov 1921; abstract: *Bull. Amer. Math. Soc.*

28:145–46 #1. Also presented under that title to a meeting of the MAA, Greeley, CO, 14–15 Apr 1922; abstract: *Amer. Math. Monthly* 29:198 #1.

Abstracts not listed above:

1923a with G. W. Smith. Certain associativity conditions in linear algebras. *Amer. Math. Monthly* 30:219–20 #1. Presented to a meeting of the MAA, Boulder, CO, 30–31 Mar 1923.

1923b with G. W. Smith. On the conditions for associating in linear algebras. *Bull. Amer. Math. Soc.* 29:125–26 #2. Presented to the AMS, Lawrence, KS, 2 Dec 1922.

1930 Foci of algebraic curves. *Amer. Math. Monthly* 37:394 #3. Presented to a meeting of the MAA, Denver, CO, 11–12 April 1930.

1933 On foci of algebraic curves with applications to cubic curves (Thesis presented by Ethel A. Rice for MA University of Colorado). *Amer. Math. Monthly* 40:387–88 #2. Presented by C. Kendall to the MAA, Fort Collins, CO, 14 Apr 1933.

1936 The projective generation of curves and surfaces. *Amer. Math. Monthly* 43:591 #9. Presented to a meeting of the MAA, Denver, CO, 17–18 Apr 1936.

1939 Morley triangles. *Amer. Math. Monthly* 46:532 #8. Presented to a meeting of the MAA, Laramie, WY, 28–29 Apr 1939.

1942 Constructions by means of a marked ruler and other instruments. *Amer. Math. Monthly* 49:512 #13. Presented to a meeting of the MAA, Golden, CO, 17–18 Apr 1942.

References to: AmMSc 4–8, 9P–10P; AmWom 1935–40; BiDWSci; BioWMath;
"Claribel Kendall, Retired CU Mathematics Professor, Dies." *Boulder Daily Camera*, 18 Apr 1965.
Struik, Ruth Rebekka. "Claribel Kendall (1889–1965)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 92–94. Westport, CT: Greenwood Press, 1987.

Other sources: PhD dissertation vita 1923; Owens questionnaire 1937; communications with Boulder Public Library and Yale University Archives; Jones and Thron, *A History of the Mathematics Departments of the University of Colorado*; "Florence Kendall," (Obituary) *Boulder Daily Camera*, 10 May 1971; US Census 1900, 1910, 1920, 1930 CO.

Last modified: March 7, 2009.

KETCHUM, Gertrude (Stith). August 4, 1903–September 27, 1958.
University of Georgia (BA 1924, MA 1928), University of Illinois (PhD 1934).

Gertrude Stith was born near Nunez, Georgia, the eldest of five surviving children of Louella (Jones) (b. ca. 1882) and John R. Stith (b. 1862), a farmer. Her mother was a native of Georgia and her father of North Carolina. At the time of the 1910 census, her mother was twenty-eight, had been married for eight years, and had three surviving children of four born. These were Gertrude, age six; Estelle, age five; and Mabelle, age four. Her father was forty-eight, had been married previously, and had a step-daughter, a son, and two daughters from a previous marriage. Gertrude Stith's parents had two children after 1910: Pauline, born in about 1913 and John in about 1921. Neither of the parents had an advanced education.

A school superintendent who boarded with the family was an inspiration to Gertrude Stith, who was the first of her siblings to go to college. Immediately after graduating from the University of Georgia, Stith began teaching in high schools in Georgia. She taught in Hawkinsville 1924–25 and in Athens 1925–28. In 1928 she also completed her work for her master's degree at the University of Georgia.

From 1928 to 1930 Stith was a student assistant in the mathematics department at Brown University. She borrowed money from a local bank to finance her studies there; nevertheless, she was unable to continue at Brown for financial reasons. However, she was able to continue her graduate education after obtaining an assistantship at the University of Illinois for the year 1930–31.

After a year at Illinois, on July 6, 1931, Gertrude Stith married Pierce Waddell Ketchum, a member of the mathematics faculty. Ketchum, born September 5, 1903, in Salt Lake City, had earned his bachelor's degree in 1922 from the University of Utah and his master's degree in 1923 and doctorate in 1926 from the University of Illinois. Except for periods away as a member of the Institute of Advanced Study in 1937–38, a fellow and visiting lecturer at Brown 1942–43, and as head of the analysis section of a gunnery school with the US Air Force 1944–45, he spent his career in the mathematics department at Illinois: as instructor 1926–28, associate 1928–37, assistant professor 1937–42, associate professor 1942–47, professor 1947–69, and professor emeritus after his retirement in 1969.

Because of anti-nepotism rules, Gertrude Stith Ketchum could not continue as a teaching assistant after her marriage. Although she was not allowed to teach, Gertrude Ketchum was allowed to continue as a graduate student, which she did for the year 1931–32. Their first child, Pierce Stith, was born in June 1933, after which Gertrude Ketchum resumed her studies in 1933–34, finished her dissertation in analysis under the direction of R. D. Carmichael, and received her PhD in 1934 with a minor in English. The following April 1935, their daughter, Laura Stith, was born. In a 1937 letter to Helen Owens about the summer meetings in State College, Pennsylvania, Ketchum noted her appreciation for the provision of entertainment for small children.

Gertrude Ketchum had two publications in mathematics, one based on her dissertation, which was published in 1936 in the *Transactions* of the AMS and was cited by other mathematicians into the early 1940s, and one a few years later that was coauthored with her husband. She continued her involvement in mathematics by proposing and solving problems that appeared in the *American Mathematical Monthly* and the *National Mathematics Magazine* at least through 1941. In 1983

her husband said that she was hurt by not being able to teach when they first married but that some years later she was able to teach part time.

Gertrude Ketchum had always been active and athletic with a particular interest in riding. In high school she had organized a girls' basketball team. At the University of Georgia she had been president of the university chapter of the YWCA, captain of the rifle team, and had ridden in university horse shows. Later she used her expertise in horsemanship as an instructor of equitation for five years at riding camps for girls.

In 1952 Gertrude Ketchum became ill with cirrhosis of the liver and died at home in Urbana six years later at age fifty-five. She was cremated and her remains interred at Fairlawn Cemetery in Decatur, Illinois. In 1961, three years after her death, P. W. Ketchum married Gertrude's younger sister Estelle.

In 1963 Laura Ketchum Kodama, the daughter of Gertrude and Pierce Ketchum, earned her PhD in mathematics from the University of California, Berkeley. P. W. Ketchum died on February 24, 1993.

Organizational affiliations: AMS, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi.

Dissertation:

1934 On certain generalizations of the Cauchy-Taylor expansion theory. PhD dissertation, University of Illinois, directed by Robert Daniel Carmichael. Typescript. Printed version, 1936, reprinted from *Trans. Amer. Math. Soc.* 40:208–24.

Publications:

1936 On certain generalizations of the Cauchy-Taylor expansion theory. *Trans. Amer. Math. Soc.* 40:208–24. Published version of PhD dissertation. Reviews: *JFM* 62.0346.03 (P. Heuser); *Zbl* 015.02904 (W. Gontscharoff). Presented by title to the AMS, Chicago, 20 Apr 1935; abstract: *Bull. Amer. Math. Soc.* 41:344–45 #244.

1938 with P. W. Ketchum. On a certain class of non-linear expansions of an arbitrary analytic function. *Ann. of Math.* 2nd ser., 39:58–64. Reviews: *JFM* 64.0288.03 (P. Heuser); *Zbl* 018.13903 (F. Lösch). Presented by G. S. Ketchum to the AMS, State College, PA, 9 Sep 1937; abstract: *Bull. Amer. Math. Soc.* 43:619 #338.

Other sources: PhD dissertation vita 1934; Owens questionnaires 1937, 1940; Owens Papers; P. W. Ketchum, conversation with author and Uta C. Merzbach, 23 Mar 1983, Urbana, IL; Stanford, "The History of the Department of Mathematics at the University of Illinois"; US Census 1900, 1910, 1920, 1930 GA, 1930 RI; Illinois death certificate.

Last modified: June 23, 2011.

KING, Eula (Weeks). September 13, 1882–June 30, 1967.
University of Missouri (BA 1908, BS 1908, MA 1909, PhD 1915).

Eula Adeline Weeks was born near Louisville, Georgia, the third of five children of Luella Vienna (Tarver) (1860–1935) and Caleb Garvin Weeks (1850–1914). Her parents, natives of Georgia, married in about 1878. Her older brothers, William Brinson (1879–1914) and Julian Charles (1880–1951), were born in Georgia; her younger sisters, Clara Belle (1887–1914) and Alice Elizabeth (1900–1991), were born in Missouri. Her father was successively a bookkeeper, a bank clerk, and later a county court clerk.

In 1900 and 1910 her family lived in Bates County, Missouri, near the Kansas border. Weeks was a teacher in the high school in Rich Hill, Missouri, from 1901 to 1907. In 1908, at age twenty-five, she received both a BA and a BS in education, and was valedictorian of the class of 1908 in the College of Arts and Science at the University of Missouri. The next year she was a university fellow in mathematics and in 1909 received a master's degree from Missouri.

Eula Weeks then went to Bryn Mawr College, where she was a fellow in mathematics 1909–10 and a fellow by courtesy 1910–11. Her occupation is listed as teacher in a preparatory school in the 1910 census, as well. The journal club at Bryn Mawr did not hold meetings 1909–10, but her presentations are recorded for 1910–11, when she spoke on the solution of numerical equations, and for 1911–12, when she presented papers on the group of homographic substitutions and on general analytic methods of solutions of transcendental equations.

After three years at Bryn Mawr, Weeks returned to Missouri, where she held a university fellowship 1914–15 and received her PhD in 1915. She was one of two students whose work was directed by E. R. Hedrick at the University of Missouri. In addition to his many research, editorial, and administrative activities, Hedrick became the first president of the MAA in 1916 and was especially involved with reforms in secondary mathematics teaching. Eula Weeks was a charter member of the MAA.

In 1916 Eula A. Weeks was a teacher at Grover Cleveland High School in St. Louis. By 1919 she had been appointed to the National Committee on Mathematical Requirements as one of three secondary school representatives. The committee was first appointed in 1916 by Hedrick as president of the MAA and was chaired by J. W. Young of Dartmouth; Weeks served on a subcommittee to report on elective courses in secondary schools. A preliminary report of the committee, issued as Secondary School Circular No. 5 by the US Bureau of Education, appeared in 1920. The final report of the committee was published by the MAA in 1923, and parts of it were reprinted by Houghton Mifflin in 1927. Weeks gave several talks about the reports at meetings of the MAA. During this period Weeks continued teaching at Cleveland High School and was active in organizations for mathematics teachers. In 1920 she was elected secretary of the mathematics section of the Missouri Society of Science and Mathematics Teachers, and she served as vice president of the NCTM 1922–23 and on the NCTM board of directors 1923–26.

Eula Weeks married Harry Lane King (1885–1966) on June 15, 1924, in St. Louis. Harry King was born in Topeka, Kansas, and was a high school teacher in St. Louis. At least in the mid-1940s he was a teacher in the industrial arts department at Grover Cleveland High School.

Eula Weeks King stopped teaching after she married, although she maintained her membership in the MAA until about 1940. The Kings had two children, Harry L. King Jr., born in 1925, and Mary Adeline, born in 1927. Their son became a civil engineer and died in 1973.

After her husband's death in 1966, King maintained the same residence in St. Louis she had had since at least 1930. She went to her son's home in Inglewood, California, about a month before her death there of a myocardial infarction at age eighty-four in June 1967.

Organizational affiliations: AMS, MAA (charter member), NCTM.

Thesis and dissertation:

1909 [Weeks, E. A.] On some classes of non-analytic functions of a complex variable. MA thesis, University of Missouri.

1915 [Weeks, E. A.] A symmetrical generalization of the theory of functions. PhD dissertation, University of Missouri, directed by Earle Raymond Hedrick.

Abstracts:

1914 [Weeks, E.] Note on the enclosable property. *Bull. Amer. Math. Soc.* 20:183–84 #8. Presented to the AMS, Columbia, MO, 29 Nov 1913.

1915 [Weeks, E. A.] With E. R. Hedrick. On a definition of discrete oscillation. *Bull. Amer. Math. Soc.* 21:220–21 #9. Presented to the AMS, Lincoln, NE, 28 Nov 1914.

1921 [Weeks, E. A.] The work of the National Committee on Mathematical Requirements. *Amer. Math. Monthly* 28:46 #4. Presented to the MAA, Kansas City, MO, 13 Nov 1920.

1922 [Weeks, E. A.] Final report of the National Committee on Mathematical Requirements. *Amer. Math. Monthly* 29:3 #7. Presented to a meeting of the MAA, St. Louis, MO, 25–26 Nov 1921.

1923 [Weeks, E. A.] The National Committee's report on the reorganization of secondary mathematics. *Amer. Math. Monthly* 30:106 #2. Presented to the MAA, Topeka, KS, 20 Jan 1923.

Other sources: Application for social security account number 1963; Byrn Mawr College Archives; communication with University of Missouri Alumni Relations and Development; US Census 1880, 1900, 1910, 1920, 1930 MO; California death certificate.

Last modified: September 23, 2015.

KLOYDA, Sister M. Thomas à Kempis. May 15, 1896–March 19, 1977. College of Saint Teresa (BA 1920), University of Michigan (MA 1926, PhD 1936).

Sister Mary Thomas à Kempis Kloyda was born Sophia Kloyda, the first of three children of Mary (Kurash) (1875–1954) and John L. Kloyda (1869–1940). Her mother was born in Iowa and her father in Prague, Bohemia. According to the 1900 census, her father immigrated to the United States in 1882 and was later naturalized. In 1900 her parents had been married five years and there were two children: Sophia, age four, born in Manly, Iowa, and George, born in July 1899 in Minnesota. The household also contained Mary Kloyda, age fifty, Sophia Kloyda's paternal grandmother. The family was living in Jackson, Minnesota, just north of the Iowa border, and her father worked as a bartender. The third child was Agnes (1902–1993). In 1920 and 1930 the family was living in Minneapolis, where her father worked as a machinist. In the 1930 census her mother was described as operator of a sewing machine.

Sophia Kloyda earned her diploma from Columbus High School in Austin, Minnesota, in 1914. She taught second and third grades the following year. In the fall of 1915 she entered the College of Saint Teresa (now closed), a private college for women sponsored by the Sisters of Saint Frances, in Winona, Minnesota. She was in residence there until 1918 and entered the Novitiate of the Sisters of Saint Francis in Rochester, Minnesota, in January 1918. She was again in residence at the college during 1919–20 and received her bachelor's degree in June 1920 with a major in mathematics and minors in botany and Latin. She was also an instructor at St. Claire Academy 1917–20.

After her graduation from college, Sister M. Thomas à Kempis taught for four years in high schools: in Minnesota 1920–22 and in Ohio 1922–24. In the summer of 1922 she began her graduate work at the University of Michigan and completed all of her work for the master's degree in November 1926 with courses taken every summer except that of 1925. She was principal of Saint Augustine High School in Minnesota during 1924–26.

In the fall of 1926 Sister Thomas à Kempis began teaching physics at the College of Saint Teresa, where she had done her undergraduate work, while also continuing her graduate work in mathematics at Michigan. She studied at Michigan during the summers of 1928 and 1929, the academic years 1930–31 and 1934–35, and again in the summer of 1935 for work on her dissertation, which she subsequently completed in the history of mathematics under the direction of Louis C. Karpinski. She received her doctorate in February 1936, a year after Sister M. Leontius Schulte, also a student of Karpinski at Michigan and her colleague at the College of Saint Teresa. The following year she published an article summarizing her study of linear and quadratic equations in Europe from 1550 to 1660; the article included a bibliography of primary sources on that topic.

Sister M. Thomas à Kempis continued her work at the College of Saint Teresa. She was head of the physics department for several years before serving as head of the mathematics department 1939–49. Her work at the college was interrupted for five years when she was asked to serve as principal of Saint Mary High School in Sleepy Eye, Minnesota, 1949–50 and of Saint Joseph High School in Ironton,

Ohio, 1950–53; she was instructor of mathematics and science at Cotter Senior High School in Winona, Minnesota, 1953–54.

In 1954 Sister M. Thomas à Kempis returned to the College of Saint Teresa, where she was again head of the department of mathematics 1954–69 and professor of mathematics from 1969 until her retirement from full-time service in 1972. During her years at the College of Saint Teresa, she was active professionally, especially with the Minnesota Section of the MAA, for which she was section chairman in 1934–35 and a member of the executive committee 1935–36, 1939–40, and 1962–63. She taught in NSF institutes for elementary school teachers during the summers of 1963 and 1964 and was a consultant at Florida Agricultural and Mechanical University during the summer of 1965. She was a member of the Minnesota Academy of Science. She wrote a number of articles during her professional life. Most were historical articles about individual mathematicians, many of whom were women.

Sister Mary Thomas à Kempis Kloyda worked part time at the college until September 1976, when she was eighty, at which time she was forced by failing eyesight and general health considerations to move to the Assisi Heights Motherhouse in Rochester, Minnesota. She died the following spring at Saint Mary's Hospital in Rochester and was buried in Calvary Cemetery in Rochester.

Organizational affiliations: MAA, NCTM, Sigma Xi.

Dissertation:

1936 Linear and quadratic equations, 1550–1660. PhD dissertation, University of Michigan, directed by Louis Charles Karpinski. Printed version, 1938, Edwards Brothers, Ann Arbor, MI; review: *JFM* 64.0911.02 (K. Vogel). See also **1937**.

Publications:

1934 [Thomas à Kempis, Sister M.] Newton's Blind Apostle, Nicholas Saunderson. *Sch. Sci. Math.* 34:569–73.

1937 Linear and quadratic equations 1550–1660. *Osiris* 3:165–92. Published version of PhD dissertation. Reviews: *Isis Critical Bibliography* 29:258; *JFM* 63.0805.01 (J. E. Hofmann).

1939a [Thomas à Kempis, Sister M.] An appreciation of Sophie Germain. *Natl. Math. Mag.* 14:81–90. Review: *JFM* 65.0015.02 (J. E. Hofmann). Presented to the MAA, Northfield, MN, 13 May 1939; abstract: *Amer. Math. Monthly* 46:533 #3.

1939b [Thomas à Kempis, Sister M.] The walking polyglot. *Scripta Math.* 6:211–17. Presented as "The walking polyglot (Maria Gaetana Agnesi)" to the MAA, Northfield, MN, 12 May 1934.

1955 [Thomas à Kempis, Sister M.] Caroline Herschel. *Scripta Math.* 21:237–51.

1966 [Thomas à Kempis, Sister M.] Mathematics and the Nobel Prize. *Math. Teacher* 59:667–68.

1967 In *New Catholic Encyclopedia*, New York: McGraw-Hill. Agnesi, Maria Gaetana, 1:205; Barrow, Isaac, 2:126; Bolzano, Bernhard, 2:653, review: *J. Symbolic Logic* 40:596 (A. Church); Boncompagni, Balthasar, 2:664; Cantor, Georg, 3:70–71; Euler, Leonhard, 5:630; Gauss, Karl Friedrich, 6:309–10; Hermite, Charles, 6:1077; Hilbert, David, 6:1116; L'Hospital, Guillaume François (L'Hôpital), 8:692; Lobachevskiĭ, Nikolaĭ Ivanovich, 8:947; Ruffini, Paolo, 12:700.

Abstracts not listed above:

1944 [Thomas à Kempis, Sister M.] A study: Caroline Herschel. *Amer. Math. Monthly* 51:614 #6. Presented to the MAA, St. Paul, MN, 6 May 1944.

1945 [Thomas à Kempis, Sister M.] Bernard Bolzano. *Amer. Math. Monthly* 52:480 #6. Presented to the MAA, St. Paul, MN, 12 May 1945.

Presentation not listed above:
Some reminiscences of Raymond Clare Archibald. Presented to the MAA, St. Paul, MN, 30 Apr 1966.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P–13P; OutEdAm 1975.
"Mathematicians of Gaussian Elimination" by Joseph F. Grcar. *Notices Amer. Math. Soc.* 58 (2011): 782–92.

Other sources: Owens questionnaires 1937, 1940; College of Saint Teresa Alumnae Office; University of Michigan Alumni Records Office; University of Michigan Graduate School; communication with Sisters of Saint Francis, Rochester, MN; US Census 1900, 1920, 1930 MN.

Last modified: October 6, 2015.

KOHLMETZ, Dorothy Bothwell. January 25, 1906–December 18, 1941.
Oberlin College (BA 1931), Ohio State University (MA 1933, PhD 1937).

Dorothy Bothwell Kohlmetz was the younger of two daughters of Alice Gray (Bothwell) (ca. 1866–1958) and George William Kohlmetz (ca. 1870–ca. 1949). Her mother, of Albany, New York, was in the Wellesley College class of 1890. Her father's family was from Germany and immigrated to the United States in 1871. Her parents married in 1896. Ruth Willis (1899–1991), her older sister, graduated from the College for Women of Western Reserve University in 1923, having been elected to Phi Beta Kappa in 1922; she was a junior high school teacher in Lakewood, Ohio, at the time of her mother's death. Most evidence indicates that Dorothy Kohlmetz was born in Albany, New York, although Cleveland, Ohio, appears as her place of birth in at least one source at Ohio State University. Her father was a purchasing agent for the Cleveland Twist Drill Company and was also author of bibliographical notes for a collection of editions of a book of local interest.

Kohlmetz attended public secondary school in Cleveland except for her last year. In 1924–25 she attended the Laurel School, a preparatory school also in Cleveland, from which she graduated in June 1925. She then studied at the Cleveland Institute of Music 1925–26.

Kohlmetz entered Oberlin in the fall of 1926 as a student in the Conservatory of Music but later changed her classification and graduated from the College of Arts and Sciences with a BA in December 1931. She entered Ohio State University in the winter quarter of 1932 and did course work there until spring quarter 1935, receiving her master's degree in 1933. She held a university scholarship in spring 1935 and, despite suffering from rheumatic heart disease, she received her doctorate in December 1937.

Dorothy Kohlmetz had been living at her family's home in Cleveland Heights, Ohio, before her death at the Cleveland Clinic Hospital at age thirty-five in 1941. She had been ill for more than six years and died a few days after major surgery. She was survived by her parents and her sister.

Organizational affiliation: Phi Beta Kappa.

Thesis and dissertation:
1933 The process of mathematical generalization. MA thesis, Ohio State University, directed by Henry Blumberg. Typescript.
1937 Certain problems of a special character in convex functions. PhD dissertation, Ohio State University, directed by Tibor Radó. Abstract: *Abstracts of doctoral dissertations. The Graduate School, Ohio State University* 26:27–30.

Other sources: PhD dissertation autobiography 1937; Wellesley College Archives; communications with Oberlin College Alumni Association, Oberlin College Archives, and Cleveland Public Library; US Census 1910, 1920, 1930 OH; Ohio death certificate.

Last modified: December 12, 2008.

KRAMER, Edna E. May 11, 1902–July 9, 1984.
Hunter College (BA 1922), Columbia University (MA 1925, PhD 1930).

Edna Ernestine Kramer was born in New York, New York, the eldest of three children of Sabine (Elowitch) (1879–1958) and Joseph Kramer (1869–1949). Her parents were born in Austria-Hungary and emigrated from there in 1886 and 1882, respectively. They had high school educations and were married in 1901. Her mother was a housewife and her father a salesman of men's clothing. Her younger sister, Martha H., born in 1904, graduated from Hunter College and was later a French teacher; her brother, Herbert E., born in 1911, had a BA and an MA from Columbia College and was a chemistry teacher. Both were elected to Phi Beta Kappa.

Kramer attended Wadleigh High School in Manhattan and graduated in 1918 at age sixteen. She later credited Dr. John A. Swenson, her first mathematics teacher at Wadleigh, with influencing her choice of mathematics as a career. She then attended Hunter College from which she graduated summa cum laude, first in her class, in 1922. In 1922–23 she taught at DeWitt Clinton High School in the Bronx, and in 1923–29 she taught at Wadleigh High School, while also doing graduate work at Columbia University. In her dissertation vita she expressed her indebtedness to Swenson, of Wadleigh, "for the interest in her which prompted him to arrange her program of teaching so as to make it possible for her to attend courses at Columbia University." She earned her master's degree in 1925 and her PhD in 1930 with a minor in physics.

Kramer, with the recommendation of Swenson, obtained a position at Montclair State Teachers College (now Montclair State University) in New Jersey in 1929. She remained there five years: as instructor 1929–32 and as assistant professor 1932–34. In 1934 she published notes that became her first book, *A First Course in Educational Statistics*, and she moved to Thomas Jefferson High School in Brooklyn as teacher and chairman of the mathematics department. The following year, on July 2, 1935, Kramer married Benedict Taxier Lassar, teacher of French and guidance counselor at Abraham Lincoln High School in Brooklyn. Lassar, born in New York City in 1906, had received a BA from CCNY, a JD from Columbia, and a Certificat d'Etudes Francaises from the University of Grenoble. He later received a master's degree from Columbia and a PhD in clinical psychology from New York University. He remained at Abraham Lincoln High School until 1962. He was also self-employed and, from 1964, was a staff psychologist at a psychotherapy center.

Edna Kramer-Lassar remained at Thomas Jefferson High School from 1934 until 1956. During this period she did further study, held several other professional positions, and was engaged in historical research and writing. She studied at the Center for Research and Graduate Education in Mathematics (later Courant Institute of Mathematical Sciences), New York University, 1939–40 and at the University of Chicago in 1941. She was instructor in the graduate division at Brooklyn College 1935–38; mathematics consultant in statistics for the US Office of Scientific Research and Development, the Division of War Research, Research Group, Columbia University 1943–45; instructor at Polytechnic Institute of Brooklyn (now Polytechnic University) 1948–53; and instructor in the graduate division at New York University 1949–50. In 1942, during its second year, Kramer served as the vice chairman of the Metropolitan New York Section of the MAA. During the war her research on anti-aircraft fire control was classified. Her first book in history of

mathematics, *The Main Stream of Mathematics*, was published by Oxford University Press in 1951. In 1952 it was chosen by the Book Find Club, an alternative to the Book-of-the-Month Club; it subsequently underwent a number of editions and was translated into Italian, Dutch, and Japanese.

In 1956 Kramer-Lassar left Thomas Jefferson High School. That year she traveled to England, France, Italy, and Switzerland to interview the women mathematicians who were the subjects of her 1957 article, "Six More Female Mathematicians," written in response to Julian L. Coolidge's 1951 *Scripta Mathematica* article, "Six Female Mathematicians." She also wrote a survey of mathematics for the *Encyclopedia Hebraica*, published in Jerusalem 1956–57.

Kramer continued her teaching at Brooklyn Polytech as adjunct professor from 1953 until 1971, when she retired with emeritus rank. She was a consultant on a special project supported by the NCTM for the University of Oregon in 1963 and participated in the writing of the resulting ten-unit series "Experiences in Mathematical Discovery" published by the NCTM in 1966. From 1965 to 1969 she did further study at NYU's Institute of Mathematical Sciences (renamed Courant Institute of Mathematical Sciences in 1966), and in 1970 her book *The Nature and Growth of Modern Mathematics* first appeared. It, too, underwent a number of later editions and was chosen as a Library of Science Book Club selection. In the early 1970s, she wrote almost all of the biographies of women mathematicians that appeared in the *Dictionary of Scientific Biography*. In 1972 she was a consultant to a committee looking to place women mathematicians in Ivy League universities, and the following year she was lecturer at Nanyang University in Singapore. She was a member of the New York Academy of Sciences. Kramer's interests included music and travel. Also in 1973 she was honored by election to the Hunter College Hall of Fame, which had been established the previous year.

Edna Kramer-Lassar had developed Parkinson's disease and suffered from a broken hip more than two years before her death from pneumonia in her home in Manhattan at age eighty-two in 1984. She was survived by her husband, her sister, and several nieces and nephews.

Organizational affiliations: AMS, MAA, AWM, Soc. Math. France, AAAS, Hist. Sci. Soc., Phi Beta Kappa, Pi Mu Epsilon.

Thesis and dissertation:

1925 The mathematical theory of the top. MA thesis, Columbia University.

1930 [Part I] Polygenic functions of the dual variable w; [Part II] The Laguerre group. PhD dissertation, Columbia University, directed by Edward Kasner. Printed version of Part I, 1930, reprinted from *Amer. J. Math.* 52:370–76.

Publications:

1930 Polygenic functions of the dual variable $w = u + jv$. *Amer. J. Math.* 52:370–76. Published version of part of PhD dissertation. Review: *JFM* 56.0957.01 (F. Lösch). Presented as noted in dissertation above.

1931 Some methods in professionalized subject matter courses in mathematics for teachers colleges. *Math. Teacher* 24:429–31.

1935 *A First Course in Educational Statistics*. New York: John Wiley and Sons. Reviews: *Amer. J. Sociology* 42:139–41 (T. C. McCormick); *J. Amer. Stat. Assoc.* 31:766–67 (R. V. Young); *Math. Gaz.* 19:242–43 (F. Sandon). Reviews excerpted in O. K. Buros, *The 1938 Mental Measurement Yearbook*, 324: *Ed.* 55:506 (A. Swope); *Ed.* [London] 67:435; *Math. Teacher* 28:252–53; *Sankhya* 2:332–33 (P. C. Mahalanobis). Rev. and enl. version of text printed by Edwards Brothers, Ann Arbor, MI, 1934.

1942 *Mathematics Takes Wings: An Aviation Supplement to Secondary Mathematics*. New York: Barrie and Edwin.
1948 The integration of trigonometry with physical science. *Math. Teacher* 41:356–61.
1951 *The Main Stream of Mathematics*. New York: Oxford University Press. Reviews: *Amer. Math. Monthly* 58:501–502 (A. D. Fleshler); *Math. Gaz.* 36:224–25 (B. A. Swinden); *Math. Mag.* 26:172–73 (E. R. Schneckenburger): *Science* 113:445–46 (E. Nagel); *Sci. Monthly* 73:205 (F. M Wadley); *Scripta Math.* 19:151–54 (P. S. Jones); *Zbl* 043.24504 (A. Speiser). Book Find Club ed.: 1952. New York: Braziller. Reissued 1955. Paperback ed.: 1961. A Premier Book. Greenwich, CT: Fawcett Publications. Review: *MR* 23#A1483 (C. Brumfiel). Reprint: 1988. Princeton Junction, NJ: Scholar's Bookshelf. Translations: Italian, 1959. *A Che Serve la Mathematica*. Milan: Feltrinelli. Dutch, 1964. *Wiskunde*. Utrecht: Het Spectrum. Japanese, 1970. Diamond Publishing Co.
1957 Six more female mathematicians. *Scripta Math.* 23:83–95. Review: *Zbl* 083.24505.
1970 *The Nature and Growth of Modern Mathematics*. New York: Hawthorn Books. Reviews: *Amer. Math. Monthly* 78:428 (L. C. Larson); *Amer. Math. Monthly* 81:418–19 (S. Regoczei); *MR* 42#2911 (C. B. Boyer); "Tracing mathematical concepts," *Science* 170:432 (D. J. Dessart); *SIAM Rev.* 13:238–40 (P. C. Hammer). Paperback ed.: 1973. 2 vols. Greenwich, Conn: Fawcett Publications. First paperback ed. with corrections: 1982. Princeton: Princeton University Press. Reviews: *Amer. Math. Monthly* 90:C66 (L. A. Steen); *Zbl* 501.01001 (E. Knobloch).
1970–75 In *Dictionary of Scientific Biography*. Agnesi, Maria Gaetana, 1 (1970): 75–77. Germain, Sophie, 5 (1972): 375–76. Hypatia, 6 (1972): 615–16. Kovalevsky, Sonya, 7 (1973): 477–80. Noether, Amalie Emmy, 10 (1974): 137–39. Noether, Max, 10 (1974): 139–41. Somerville, Mary Fairfax Greig, 12 (1975): 521–25.
1973 The contributions of women to the development of mathematics. *Newslett. Southeast Asian Math. Soc.* 4:4.1–4.3.

Abstracts:
1929 The Laguerre group and allied topics. *Bull. Amer. Math. Soc.* 35:290 #2. Presented to the AMS, New York City, 23 Feb 1929.
1942 [Kramer-Lassar, E. E.] Spatial and probable relationships in secondary mathematics. *Amer. Math. Monthly* 49:508 #7. Presented to the MAA, New York City, 18 Apr 1942.

References to: AmMSc 5, 9P–11P; AmMWSc 12P–13P, 14; BiDWSci; BioWMath; ConAu 107, 113, 170; MacTutor; Sc&ItsT 7; WhoAmW 3, 8–10.
Lipsey, Sally Irene. "Edna Ernestine Kramer Lassar (1902–1984)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. L. S. Grinstein and P. J. Campbell, 114–20. Westport, CT: Greenwood Press, 1987.
"Dr. Edna Kramer-Lassar, 82, Ex-Professor of Mathematics." (Obituary) *New York Times*, 25 Jul 1984.

Other sources: PhD dissertation vita 1930; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1982 (prepared by Benedict T. Lassar); Hunter College Archives; US Census 1910, 1920 NY.

Last modified: November 30, 2010.

LADD-FRANKLIN, Christine. December 1, 1847–March 5, 1930.
Vassar College (BA 1869), Johns Hopkins University (PhD completed 1882, awarded 1926).

Christine Ladd was born in Windsor, Connecticut, the eldest of the three children of Augusta F. (Niles) (1825–1860) and Eliphalet Ladd (1822–1885). Both of her parents came from old New England families, her father's from New Hampshire and her mother's from Connecticut. Her parents married in 1846. Her brother, Henry (b. 1850), was born while the family lived in New York where her father was a merchant. Her sister, Jane Augusta (b. 1854), was born after the family had moved to her maternal grandmother's home in the Poquonock section of Windsor in 1853. Many years later Ladd described her father as having been both a merchant and a gentleman farmer. Ladd's mother, who was a supporter of women's rights, died of pneumonia when Ladd was twelve. Soon after her mother's death Ladd began keeping a journal. In 1862 her father married Mary E. Barnes (1839–1903), and they had two children, Katharine (b. 1865) and George B. (1867–1881).

From 1860 to 1863, Ladd attended schools in Portsmouth, New Hampshire, while living with her paternal grandmother. She spent the next two years at a college preparatory school, the Wesleyan Academy. The school had been coeducational since it opened in Wilbraham, Massachusetts, in 1825 because "in the school as in the [Methodist] church, the sexes were to have a common platform of opportunity" (Sherman, *History of the Wesleyan Academy*, 77). Nonetheless, the male and female students were enrolled in different courses of study, and at graduation males presented orations and females presented essays. Although a number of sources say that Ladd graduated as valedictorian of her class, the program for the June 1865 "Anniversary Exercises of Wesleyan Academy" lists another female student as presenting the "Valedictory Essay" and Ladd as presenting the "Classical Essay."

Just before leaving for her second year at Wilbraham, Ladd saw a notice announcing the planned opening of Vassar College in fall 1865. She hoped to attend but did not think her father would "give his consent to such a Quixotic scheme" (Ladd Diary, 10 Aug 1864). In fact, Ladd's father, who was very supportive of her studies at Wilbraham, had financial and health problems in the mid-1860s, and Ladd spent 1865–66, the year after she graduated from Wilbraham, at home in Poquonock with her infant half-sister. Her maternal grandmother, eighty-one years old in 1865, was not supportive of her furthering her education, thinking that Ladd would not be able to find a husband after college. However, by the end of July 1866 Ladd had convinced her grandmother to support her plans to attend college and had convinced her mother's older sister, Juliet Niles, to pay the tuition. At first her father did not approve her plans but agreed in a short time, and in September 1866 Ladd enrolled at Vassar. Ladd studied at Vassar 1866–67 and 1868–69. She did not return 1867–68 because of a lack of funds; instead, she spent the fall semester teaching in Utica, New York. At Vassar she was influenced strongly by the astronomer Maria Mitchell and by Charles S. Farrar, professor of mathematics, natural philosophy, and chemistry. She was most interested in physics, particularly in the vibrations of the elastic pendulum.

After graduating from Vassar in 1869, Ladd began teaching at a girls' school in Hollidaysburg, a town near Altoona in the mountains of central Pennsylvania. She

spent two years there and at the beginning of her second year teaching reported that she was doing "special investigations in Physics, and in mathematical research" (letter to Auntie [Juliet Niles], 7 Sep 1870). In May 1871 she was offered, and accepted, a position at a seminary in Washington, Pennsylvania, in the southwestern part of the state. While in Washington, she studied with George C. Vose, a professor of mathematics at Washington and Jefferson College, then a small all-male liberal arts college. Ladd described Vose as "among the first ten or twelve mathematicians in the country ... [who] leaves his family to poverty and dirt, while he absorbs himself in Quarternions [*sic*]" (Ladd Diary, 14 Nov 1871). Prior to working with Vose, Ladd had considered studying in Cambridge, Massachusetts, with James Mills Peirce or in St. Louis, Missouri, with William Chauvenet. In a June 9, 1872, entry in her diary Ladd mentions what appears to be her first publication in mathematics, a problem on quaternions that appeared in the London *Educational Times*. One month later, on July 16, she wrote in her diary that she had intended to spend the entire summer vacation studying with Vose; however, her brother had intimated in a letter "that filial obligations require my presence at home," so she would stay in Pennsylvania only until the end of the month.

The last entry in the Ladd diaries preserved at Vassar College was on April 27, 1873, and was written while she was living with relatives in Boston, Massachusetts. It begins, "From October to January, Mathematical courses at Harvard University. Not as profitable as they might have been, as they were not followed by an examination." Although the "Harvard Annex," the precursor to Radcliffe College officially known as the Cambridge Society for the Collegiate Instruction of Women, was not founded until 1879, and there is no record of Ladd's having attended classes at Harvard, she reported in November 1872 that she was regularly enrolled as a student there and was attending lectures of W. E. Byerly, then a graduate student, and J. M. Peirce, "Jimmie Mills as we Harvard fellows call him" (letter to Auntie, 3 Nov 1872, Box 2, Christine Ladd Franklin and Fabian Franklin papers). Although the final entry in her diary concludes: "Have applied for a second degree at Vassar" (27 Apr 1873), Ladd did not continue her formal studies at the time. She remained in the Boston area, taught at Chelsea High School, and continued her informal work in mathematics. In early 1875 Ladd's first publication, other than problems and their solutions, appeared in the *Analyst*, the recently founded American journal, which became the *Annals of Mathematics* in 1884. In it she reported on the contents of the *Journal für die reine und angewandte Mathematik* (Crelle's Journal), one of the most important European mathematical journals, and noted that in the Boston Public Library the journal was on the shelves with its leaves uncut.

By the spring of 1875 Ladd was teaching in Union Springs, New York. In the spring of 1876 she met friends from Woods Hole while visiting nearby Cornell University and spent some time studying biology. It appears that she also studied mathematics at Cornell. J. L. Coolidge's obituary of W. E. Byerly in the *Bulletin* of the AMS notes that Ladd was a student of Byerly when he was an assistant professor at Cornell 1873–76. It also suggests that Byerly's experience teaching her may have been a factor in his "favorable opinion of the intellectual capacity of women" and his 1879 support for providing private classes for women at Harvard, where he was then an assistant professor (p. 296).

Ladd remained in Union Springs through at least May 1878. In a letter of March 1877 she reported that she was writing a mathematics book. Also while in Union

Springs, problems that she posed and those that she solved appeared frequently in the *Educational Times*; the *Analyst*; the *Mathematical Visitor*; and a local newspaper, the *Yates County Chronicle*. From the first issue of the *Mathematical Visitor* (October 1877) we learn that Ladd is "Professor of Natural Sciences and Chemistry, Howland School, Union Springs, Cayuga County, New York."

On March 27, 1878, Ladd wrote to J. J. Sylvester asking him whether Johns Hopkins University would refuse her permission to listen to his lectures "on account of [her] sex?" (Gilman Papers). At the time she did not mention her publications but described herself only as "a graduate of Vassar College ... [who had] attended mathematical lectures at Harvard University." On April 2, 1878, Sylvester wrote Daniel Coit Gilman, president of Johns Hopkins, that he "should rejoice to have her as a fellow worker among us.... My own impression is that her presence among us would be a source of additional strength to the University." In an undated letter detailing Ladd's accomplishments he noted that "she is favorably known to Dr. Salmon and Prof. Cayley with each of whom she has corresponded on Mathematical subjects correcting an error or imperfection in a treatise of the one and suggesting an improvement in a memoir or book of the other. She is well known in America and England and in a second number of The Analyst ... she has written a profound paper on Quaternions" (Gilman Papers).

Despite this endorsement by Sylvester, Johns Hopkins would not admit her, or any other woman, as a student. However, the executive committee of the board of trustees was "willing that the Faculty should examine & certify to the attainments of ladies who may offer themselves, without having been instructed here, as candidates for academic degrees" (D. C. Gilman to Miss Ladd, April 26, 1878, MS 1, Daniel Coit Gilman Papers, Special Collections, Sheridan Libraries, The Johns Hopkins University). They also consented to her attending Sylvester's lectures without charging her tuition.

Ladd spent the next four years studying at Johns Hopkins and traveling in Europe. During this time she was not officially enrolled in the university but, at times, received the stipend of a fellow. She continued contributing to the *Educational Times* and the *Analyst* and published substantial articles in the second and third volumes of the *American Journal of Mathematics*. She appears to have enjoyed strong support from the mathematics faculty. An apparently unsolicited letter from William E. Story, Thomas Craig, Fabian Franklin, and O. H. Mitchell suggested that she be given the fellow's stipend upon her return from an extended trip to Europe in early 1882. The spring 1882 term was her last at Johns Hopkins. What should have been her dissertation for an 1882 PhD was published in *Studies in Logic by Members of the Johns Hopkins University*, which was edited by her advisor, C. S. Peirce, brother of J. M. Peirce with whom Ladd had studied at Harvard. However, the board of trustees did not permit her to be awarded the degree because she was a woman.

On August 24, 1882, Ladd married Fabian Franklin (1853–1939), a member of the Johns Hopkins mathematics faculty. Franklin was born in Eger, Hungary, immigrated to the United States when he was four, received his bachelor's degree from Columbian College (now George Washington University) in 1869, worked as a civil engineer and surveyor until 1877, and earned his PhD in mathematics at Johns Hopkins in 1880. In June 1883, their infant son died shortly after his birth. Two months later, on August 17, Lucien A. Wait, then associate professor of mathematics at

Cornell, wrote to Fabian Franklin: "I am very glad to hear that Mrs. Franklin has so much improved. Her acceptance of work in my correspondence University gives me great pleasure" (Box 6, Christine Ladd Franklin and Fabian Franklin Papers). However, there is no indication that she ever actively participated in this venture. The following summer she gave birth to a daughter, Margaret Ladd Franklin.

Although Christine Ladd-Franklin never held a regular position in Baltimore, in 1887 she reported that she taught "for an hour or so every morning in Miss Randolph's school" and that she had "no private pupils at present" (letter to Auntie, 14 Nov 1887). Later, in 1889, she turned down a position as lecturer at Bryn Mawr. During this time she continued her mathematical research and began a career in the area of physiological optics. Her first paper in this field, which was a mathematical investigation of binocular vision, appeared in 1887. That same year Vassar College bestowed on her an LLD, the only honorary degree it has ever granted. During this period some of her papers appeared under the hyphenated name Christine Ladd-Franklin, but she did not use this name consistently until about 1905; before then her name appeared in various forms including C. Ladd Franklin.

In 1891 Fabian Franklin took a sabbatical leave in Germany with his wife and daughter. Ladd-Franklin spent part of that year in Göttingen in the laboratory of G. E. Müller but was denied the official status of student. She also spent part of the year in Berlin working in Hermann von Helmholtz's laboratory. While in Berlin she began a correspondence with Felix Klein concerning the admission of women to Göttingen. In May 1892 she learned from Klein that "for the time being [the Göttingen faculty] mainly support only what will not satisfy you, the admission of female guest auditors (under control of the prorector [vice chancellor] and with the assumed assent of each individual docent)" (Box 4, Christine Ladd Franklin and Fabian Franklin papers). The next summer, at the World's Columbian Exposition in Chicago, she met Mary Frances Winston (Newson), who was to become one of the first three guest students and the first American woman to earn a PhD in mathematics from a German university. When Winston did not receive a fellowship from the Association for Collegiate Alumnae (ACA, later AAUW) in order to attend Göttingen, Ladd-Franklin offered her $500 to help cover her costs for the year.

In 1894 Ladd-Franklin returned to Berlin without her family in order to work for several months on her theory of color vision in Arthur König's laboratory. She had announced her first results in this area two years earlier and continued publishing in it for another thirty years. In a 2000 article, D. C. McCarty included Ladd-Franklin among seven names that appeared in "name indices of historical works on logic and ... on those on nineteenth century perceptual physiology" and noted that "in those days, a liaison between thought and sight was recorded in the vocabulary that physiologists and psychologists adopted for visual processes and phenomena" (p. 368). It was on the basis of work in this field that in 1906 Christine Ladd-Franklin was starred for psychology in the first edition of *American Men of Science*. It was also on the basis of this work that she was offered an honorary doctorate by Johns Hopkins to be bestowed during the university's fiftieth anniversary celebration in 1926. Rather than accept the honorary degree, she asked for the doctorate she had earned forty-four years earlier. On February 6, 1926, Frank J. Goodnow, then President of Yale, wrote Ladd-Franklin that

> It gives me pleasure to inform you that at the last meeting of the Board of Trustees I was authorized, on the recommendation of the

> Academic Council, to confer upon you the degree of Doctor of Philosophy in this University, in recognition of the work done by you while in residence as a graduate student and as Fellow. At that time as you know it was the policy of this Institution not to give degrees to women. Since then we have seen the light and no doubt the distinguished service which you have rendered to the advancement of knowledge since your residence among us has aiding in bringing about this change of policy. (Franklin, Christine Ladd file, Records of the Office of Alumni Information Services, Johns Hopkins University)

During the time that she was working in the theory of color vision, Ladd-Franklin kept up her interest in logic. In 1892 she published a review of the first volume of Ernst Schröder's *Vorlesungen über die Algebra der Logik*; that review has been cited frequently in articles on the history of logic. In 1893 she asked to give a series of lectures on that subject at Johns Hopkins and was turned down. Starting in 1904 she became the only woman on the Johns Hopkins faculty, teaching there as a part-time lecturer in logic and psychology while being paid considerably less than the $500 stipend she had received as a student. There was no question of anti-nepotism practices keeping her from being hired since Fabian Franklin had resigned his position as associate professor at Johns Hopkins in 1895 in order to become editor of the *Baltimore News*. She remained a part-time lecturer until 1909 when she moved to New York with her family. The move to New York was to allow Fabian Franklin to take a job as an associate editor of the *New York Evening Post*. He resigned that position in February 1917 over a political disagreement with the paper's owner and in 1919 started his own literary and political weekly publication, *The Review*, which later merged with *The Independent* to become *The Independent and The Weekly Review*. While in New York, Christine Ladd-Franklin taught as an unpaid part-time lecturer in logic and psychology at Columbia University.

In addition to her many scholarly publications, Ladd-Franklin frequently wrote popular articles and letters to newspapers and news magazines, none of which are included in her list of publications below. These were mainly concerned with women's rights, but also addressed other current events in which she had an interest, such as the use of Esperanto or the less well known international language Ido. She worked particularly hard in the cause of women's higher education. In 1897 she was involved in the formation of an organization to advance this cause, the Baltimore Association for the Promotion of the University Education of Women, and served as its chairman pro tem. This association tried to get Johns Hopkins to open its graduate school to women. This attempt was not successful, and the trustees did not agree to enroll women officially in graduate courses until 1907. At various times Ladd-Franklin served on the ACA committee on fellowships, serving as its first chairman, and speaking to that association on "The Usefulness of Fellowships" in October 1894. That talk was reprinted in the *AAUW Journal* in March 1953 with the comment that "sixty-three years later, it strikes such a sympathetic chord for those of us most closely associated with our fellowship program that we cannot resist representing it here in its entirety" (46:166). In 1899–1900 she and the three women who had received ACA European fellowships in mathematics, Ruth Gentry, Annie MacKinnon (Fitch), and Mary Winston (Newson), served on the ACA Council to Accredit Women for Advanced Work in Foreign Universities. She was

also instrumental in the establishment of the Sarah Berliner fellowship and served as chairman of the committee that made the award until 1919 when the AAUW took over that role.

Christine Ladd-Franklin's scholarly bibliography includes over one hundred articles and reviews in logic and color theory. In 1929, the year before she died, a volume containing her collected works on color vision was published in the series International Library of Psychology, Philosophy, and Scientific Method; it was reprinted in 1973 in the series Classics in Psychology. In addition to the selected publications listed below and the many papers in color theory, there are additional mathematical works, published mainly under the name Ladd, including more than fifty solutions of questions from the *Educational Times* and the *Analyst*, some of which were abstracted in the *Jahrbüch über die Fortschritte der Mathematik* (JFM) or listed in Alonzo Church's "Bibliography of Symbolic Logic (1666–1935)" in the inaugural volume of the *Journal of Symbolic Logic*. JFM also listed two mathematical papers that Ladd published in the *Educational Times* and Church listed articles that she had written for J. Mark Baldwin's 1902 *Dictionary of Philosophy and Psychology*, for which she served as associate editor for logic and psychology. In addition, Church's bibliography included an article on symbolic logic, which Ladd-Franklin had coauthored with E. V. Huntington, that appeared in the 1905 *Encyclopedia Americana*; in 1908 E. B. Wilson wrote in a review of a 1906 "critical-historical study of the logical calculus" that "the mathematician is almost certain to find more of value to him in the excellent though brief account of symbolic logic" by Huntington and Ladd-Franklin (p. 190). In 1938 she was described as "always militant in behalf of her color theory and the rights of women" (Boring, 414). Her work in logic was examined in a 1999 article in the *Bulletin of Symbolic Logic.*

Christine Ladd-Franklin died of pneumonia at age eighty-two at her home in New York City in 1930. She was survived by her husband and her daughter.

Organizational affiliations: AAAS, Optical Soc., Philos. Assoc., Psych. Assoc., Phi Beta Kappa.

Dissertation:

1883 [Ladd, C.] On the algebra of logic. PhD dissertation, Johns Hopkins University, directed by Charles Sanders Peirce. In *Studies in Logic by Members of the Johns Hopkins University*, ed. C. S. Peirce, 17–71. Boston: Little, Brown, and Co. PhD completed 1882, granted 1926. See **1883a**.

Selected mathematical and mathematically related publications:

1875 [Ladd, C.] Crelle's Journal. *Analyst* 2:51–52.

1877a [Ladd, C.] Determination of the locus of O. *Analyst* 4:47–48 (figure p. 22).

1877b [Ladd, C.] Quaternions. *Analyst* 4:172–74. Review: *JFM* 09.0411.01 (J. W. L. Glaisher).

1878a [Ladd, C.] [Mathematical Paper] **142**. Note on the solution of a congruence of the first degree when the modulus is a composite number. *Educ. Times* 31 (Sept): 244. Reprint: *Mathematical Questions, with their Solutions, from the "Educational Times"* 30 (1879): 41–42. Review of reprint: *JFM* 10.0139.02 (C. Ohrtmann).

1878b [Ladd, C.] On some properties of four circles inscribed in one and circumscribed about another. *Analyst* 5:116–17.

1878c [Ladd, C.] The polynomial theorem. *Analyst* 5:145–47. Review: *JFM* 10.0190.01 (J. W. L. Glaisher).

1879a [Ladd, C.] [Mathematical Paper] **154**. Note on Landau's theorem. *Educ. Times* 32 (Feb): 66. Reprint: *Mathematical Questions with their Solutions, from the "Educational Times"* 31 (1879): 39. Review of reprint: *JFM* 11.0287.01 (C. Ohrtmann).

1879b [Ladd, C.] The Pascal hexagram. *Amer. J. Math.* 2:1–12. Review: *JFM* 11.0395.01 (A. Maynz).
1880a [Ladd, C.] The nine-line conic. *Analyst* 7:147–49. Review: *JFM* 12.0475.02 (J. W. L. Glaisher).
1880b [Ladd, C.] On De Morgan's extension of the algebraic processes. *Amer. J. Math.* 3:210–25. Errata, 3:v. Review: *JFM* 12.0045.03 (E. Netto).
1881 [Ladd, C.] On segments made on lines by curves. *Amer. J. Math.* 4:272.
1883a [Ladd, C.] On the algebra of logic. In *Studies in Logic by Members of the Johns Hopkins University*, ed. C. S. Peirce, 17–71. Boston: Little, Brown, and Co. PhD dissertation. Reviews of volume: *Science* 1:514–16; *Mind* 8:594–603 (J. Venn).
1883b The Pascal hexagram. *Science* 1:592–94.
1885a On the so-called d'Alembert-Carnot geometrical paradox. *Messenger Math.* 15:36–37. Review: *JFM* 17.0507.03 (J. W. L. Glaisher).
1885b Richet on mental suggestion. *Science* 5:132–34.
1887 A method for the experimental determination of the horopter. *Amer. J. Psych.* 1:99–111.
1889 On some characteristics of symbolic logic. *Amer. J. Psych.* 2:543–67.
1890a Review of *Elements of Logic as a Science of Propositions*, by E. E. Constance. *Mind* 15:559–63.
1890b Some proposed reforms in common logic. *Mind* 15:75–88.
1892 Review of *Vorlesungen über die Algebra der Logik (Exakte Logik)*, vol. 1, by E. Schröder. *Mind* n.s., 1:126–33.
1894 Sophie Germain, an unknown mathematician. *Century* 48:946–49. Postscript: 49 (1894): 157. Reprint: 1981. *AWM Newsletter* 11 (3): 7–11.
1896 The position of retinal images. *Nature* 53:341. Review: *JFM* 27.0721.01 (E. Lampe).
1899a Pictures in three dimensions. *Science* n.s., 10:45–6.
1899b Review of *German Higher Schools: The History, Organization and Methods of Secondary Education in Germany*, by J. E. Russell. *Science* n.s., 10:116–18.
1901 The reduction to absurdity of the ordinary treatment of the syllogism. *Science* n.s., 13:574–76. Review: *Bibliogr. Symbolic Logic, 1666–1935* #62.6. Presented to the Amer. Psych. Assoc., Baltimore, MD, 28 Dec 1900.
1911 The foundations of philosophy: explicit primitives. *J. Philos., Psych. Sci. Methods* 8:708–13. Further discussion on this paper appeared as: "Explicit primitives: a reply to Mrs. Franklin" by Warner Fite, 9:155–58 and "Explicit primitives again: a reply to Professor Fite" by Christine Ladd-Franklin, 9:580–85.
1912 Implication and existence in logic. *Philos. Rev.* 21:641–65. Presented to meeting of the Amer. Philos. Soc., Dec 1911.
1916 Charles S. Peirce at The Johns Hopkins. *J. Philos., Psych. Sci. Methods* 13:715–22.
1927 The antilogism. *Psyche* 8:100–103.
1928 The antilogism. *Mind* n.s., 37:532–34.
1931 La non-existence de l'existence: l'idéaliste pur et le réaliste hypothétique. *Rev. metaphys. morale* (Apr-Jun): 1–23.

Mathematical abstracts not listed above:
1918a Bertrand Russell and symbol logic. *Bull. Amer. Math. Soc.* 25:59–60 #20. Presented to a meeting of the AMS, Hanover, NH, 4–6 Sep 1918.
1918b Symbol logic and Bertrand Russell. *Philos. Rev.* 27:177–78. Presented to a meeting of the Amer. Philos. Assoc., Princeton, NJ, 27–28 Dec 1917.

Collected works on color vision:
1929 *Colour and Colour Theories.* International Library of Psychology, Philosophy, and Scientific Method. New York: Harcourt, Brace and Co. and London: Kegan Paul, Trench, Trubner and Co. Review: *Science* 69:647 (H. C. Warren). Reprint: 1973. New York: Classics in Psychology. Arno Press.

Selected references to: AmMSc 1–4; AmWomSc; AmNatBi; AZWoSci; BiCAW; BiDcPsy; BiDPsy; BiDWSci; BioWMath; CamDcAB; DcAmB; DcMAP; DcNAA; DcWomW; EncWB 2–23; InWom; InWom SUP; MacTutor; NatCAB 5,26; NotMat; NotSci 2; NotTwCS 1; NotWoMa; NotWoSc; Poggendorff 3–4, 6; Sc&ItsT 6; TwCBDA; WhAm 1; WhoEast 1930; WomSc; WomFir; WomWorHis.
Reyes y Prósper, Ventura. "Cristina Ladd Franklin. Matemática americana y su influencia en la lógica simbólica." *El Progreso Matemático* 1 (1891): 297–300.
Burr, Henry W. "Mrs. Ladd-Franklin." *New York Times*, 24 Jun 1922.
"Will Get Belated Degree." *New York Times*, 21 Feb 1926.
"To Restore Ideal at Johns Hopkins." *New York Times*, 23 Feb 1926.
"Woman PhD at 78 Tells Life Story." *New York World*, 28 Feb 1926.
Shen, Eugene. "The Ladd-Franklin Formula in Logic: The Antilogism." *Mind* n.s., 36 (1927): 54–60.
"Dr. Ladd-Franklin, Educator, 82, Dies." *New York Times*, 6 Mar 1930.
"For Anti-Feminists to Consider." Editorial. *New York Times*, 7 Mar 1930.
Woodward, R. S. "Obituary: Christine Ladd-Franklin." *Science* 71 (21 Mar 1930): 307.
"Scientist and Pioneer." *The Woman's Journal* 15 (Apr 1930): 29.
Hurvich, Dorothea Jameson. "Christine Ladd-Franklin." In *Notable American Women: A Biographical Dictionary, 1607–1950*, ed. Edward T. James, 2:354–56. Cambridge, MA: Belknap Press of Harvard University Press, 1971.
Jacob, Kathryn. "How Johns Hopkins Protected Women from 'The Rougher Influences'." *AWM Newsletter* 6 (Summer 1976): 3–4.
Bushaw, D. "Mathematical Portraits–II. Christine Ladd-Franklin." *Mathematical Notes Washington State University* 20 (Feb 1977): 2–3.
Stevens, Gwendolyn, and Sheldon Gardner. *Women of Psychology: Pioneers and Innovators*, vol. 2. Cambridge, MA: Schenkman Publishing Co., 1982.
Green, Judy. "Christine Ladd-Franklin (1847–1930)." In *Women of Mathematics: A Bibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 121–28. Westport, CT: Greenwood Press, 1987.
Cadwallader, Thomas C., and Joyce V. Cadwallader. "Christine Ladd-Franklin (1847-1930)." In *Women in Psychology: A Bio-Bibliographic Sourcebook*, eds. Agnes N. O'Connell and Nancy Felipe Russo, 222–29. Westport, CT.: Greenwood Press, 1990.
Furumoto, Laurel. "Joining Separate Spheres—Christine Ladd-Franklin, Woman–Scientist (1847–1930)." *American Psychologist* 47 (1992): 175–182.
Russinoff, I. Susan. "The Syllogism's Final Solution." *Bull. Symbolic Logic* 5 (1999): 451–69.

Related manuscript materials:

Ladd-Franklin, Christine. Christine Ladd Franklin and Fabian Franklin Papers ca. 1900–1939. Rare Book and Manuscript Library. Columbia University. New York, New York.
Ladd-Franklin, Christine. Diaries, 1860–1873. Archives and Special Collections. Vassar College Library. Poughkeepsie, New York. Diary for 1866–73 also in Hudson River Valley Heritage Digital Collections.

Other sources: Johns Hopkins University Archives (Daniel Coit Gilman Papers, C. S. Peirce Papers, and Records of the Office of Alumni Information Services); Vassar College Archives; Green and LaDuke, "Contributors to American Mathematics"; Rev. D. Sherman, DD, *History of the Wesleyan Academy at Wilbraham, Mass. 1817-1890* (Boston: The McDonald & Gill Co., 1893); E. B. Wilson, "Symbolic Logic," *Bull. Amer. Math. Soc.* 14 (1908): 175–91; "Doctors' Dissertations: 1876–1926," *The Johns Hopkins Univ. Circular* 45 no. 373 (August 1926); J. L. Coolidge, "William Elwood Byerly – In Memoriam," *Bull. Amer. Math. Soc.* 42 (1936): 295–98; E. G. Boring, "The Society of Experimental Psychologists: 1904–1938," *Amer. J. Psych.* 51 (1938): 410–23; Hugh Hawkes, *Pioneer: A History of the Johns Hopkins University 1874–1889*, (Ithaca, NY: Cornell University

Press, 1960); Stanley Rabinowitz, ed., *Problems and Solutions from The Mathematical Visitor 1877–1896*, (Westford, MA: MathPro Press, 1996); D. C. McCarty, "Optics of Thought: Logic and Vision in Müller, Helmholtz, and Frege," *Notre Dame J. Formal Logic* 41 (2000): 365–78; communication with James J. Tattersall, compiler of mathematical problems database, March 2010 and 2014; WhoEast 1930 (Fabian Franklin); US Census 1850 NY, 1860 NH, 1860, 1870 CT, 1880, 1900 MD, 1910, 1930 NY.

Last modified: January 27, 2016.

LANDERS, Mary (Kenny). February 5, 1905–November 18, 1990.
Brown University (Women's College) (BA 1926), Brown University (MA 1927), University of Chicago (PhD 1939).

Mary Virginia Kenny was born in Fall River, Massachusetts, the eldest of six children of Katherine (Connell) (1876–1958) and Bernard Francis Kenny (1878–1963). Her mother was a native of Massachusetts, and her father was born in England before immigrating to the United States in 1893. Both were of Irish ancestry. In the 1920 and 1930 US census her father's occupation was listed as letter carrier, civil service. The other children in the family were Margaret, Dorothy, Mildred, Rita, and Bernard Jr., the youngest. They ranged in age from about a year younger than Mary to about a dozen years younger.

Kenny attended public schools in Fall River before entering Women's College in Brown University in September 1922. Yearbook entries indicate that she played violin and was a skilled debater. After receiving her bachelor's degree in 1926, she stayed at Brown as an Anne Crosby Emery fellow in the mathematics department and received her master's degree in June 1927. Kenny was an instructor on a temporary assignment in the mathematics department at Hunter College 1927–28 and during that year became a member of the American Mathematical Society as a nominee of the publishing company Allyn and Bacon. The temporary nature of her appointment was dropped in 1928. She continued her graduate work in mathematics by taking one class at Columbia University each semester during the years 1928–30 while teaching at Hunter. Beginning in spring 1930, and continuing through spring 1932, Kenny taught in the evening and extension sessions at Hunter.

A fellow student and an assistant in the department at Brown during 1926–27 was Aubrey Wilfred Landers Jr. He was born in New Hampshire on September 2, 1906, and received a BA from Acadia University in Nova Scotia in 1926. Landers continued as assistant at Brown until 1929, when he received his MS in mathematics. That spring R. G. D. Richardson at Brown wrote several letters of recommendation for Landers to institutions in New York City, noting that Landers had personal reasons for wanting to be in the city. In 1929–30, Landers continued his graduate work by taking a class (six semester hours) at Columbia University while teaching as an instructor at Hunter College. That summer Kenny and Landers returned to Providence to attend the first of many meetings of the American Mathematical Society. That fall Landers moved to Brooklyn College as instructor, but in spring 1931 he joined Kenny teaching in the evening and extension sessions at Hunter. On July 30, 1932, Mary Kenny and Landers were married, after which they continued their positions at Hunter and Brooklyn College, respectively.

In the summer of 1933, Mary and Aubrey Landers resumed their graduate work, this time at the University of Chicago. They were in residence 1933–34 and all summers 1933–39 except for 1936. They worked in the calculus of variations, and the dissertations of both were supervised jointly by G. A. Bliss and his former PhD student at Chicago, M. R. Hestenes. Mary K. Landers and Aubrey W. Landers received their doctorates in December 1939. They and Ellen Clayton Stokes were the last of the fifty-three PhD students of Bliss.

Mary Landers continued at Hunter College as instructor 1928–47, assistant professor 1947–58, associate professor 1958–63, professor 1964–75, and professor emeritus after 1975. In 1941 she and Marguerite D. Darkow, then an assistant professor at Hunter, produced a preliminary edition of a book, *Elementary Mathematics*.

Aubrey Landers was at Brooklyn College as instructor 1930–47, assistant professor 1947–52, associate professor 1952–67, professor 1967–74, and professor emeritus after 1974. In 1967–68, he directed Brooklyn College's Office of Grants and Research.

During World War II, Aubrey Landers was on military leave from Brooklyn College. As an officer in the US Naval Reserve, he was on active duty in Washington, D.C., from 1942 to 1946, doing cryptographic work. Mary Landers, who remained in New York, joined him in Washington in January 1944, two days before their son, Robert, was (prematurely) born. On leave from Hunter College, Mary Landers remained in Washington, and in September 1945 gave birth to a daughter, Patricia. The war over, the family moved back to New York in May 1946. By adjusting their teaching schedules and later hiring a housekeeper, they were able to resume full-time teaching. Their third child, Richard, was born in New York in January 1949.

Both of the Landers were engaged in early efforts to improve conditions for members of the college teaching profession. From 1959 to 1972, Mary Landers was secretary of the Legislative Conference, an organization that represented the professional staff of the public colleges in New York City and sought to influence legislation affecting the faculty and administrators. The conference merged with the United Federation of College Teachers in 1972 to become the Professional Staff Congress and the bargaining agent for the professional staff at City University of New York (CUNY). Mary Landers served as co-secretary of the new organization and as co-chairman of the Hunter College unit. In a November 20, 1964, article in the *New York Times* on the City University budget, Mary Landers is quoted as declaring that "too few promotions and too heavy a teaching load are two areas of great dissatisfaction to many members of the faculties." She also served as trustee of the City University Welfare Board and as chairman of the Isabelle Scott Bollard Scholarship Committee. Organizational affiliations in addition to those listed below include the New York Academy of Sciences and the New York State Teachers Association.

Aubrey Landers died on May 2, 1986. Mary Landers died in the Rhode Island Hospital in Providence of colon cancer four and a half years later at the age of eighty-five. She was survived by her three children, two sisters, and seven grandchildren. Both Aubrey and Mary Landers are buried in Swan Point Cemetery in Providence.

Organizational affiliations: AMS, MAA, AAAS, Sigma Delta Epsilon, NEA, AAUW, AAUP, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1927 [Kenny, M. V.] The Dedekind and Cantor systems of irrational numbers and a proof of their equivalence. MA thesis, Brown University. Typescript.

1939 The Hamilton-Jacobi theory for the problems of Bolza and Mayer. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss and Magnus Rudolph Hestenes. Private edition, 1942, distributed by the University of Chicago Libraries, reprinted from *Contributions to the Calculus of Variations, 1938–1941*, 209–91. Chicago: University of Chicago Press.

Publications:

1940 Review of *The Place of Mathematics in Secondary Education: The Final Report of the Joint Commission of the Mathematical Association of America and the National Council of Teachers of Mathematics. Scripta Math.* 7:133–38.

1942 The Hamilton-Jacobi theory for the problems of Bolza and Mayer. In *Contributions to the Calculus of Variations, 1938–1941*, 209–91. Chicago: University of Chicago Press. Published version of PhD dissertation. Review: *MR* 4,47a (C. B. Tompkins).

References to: AmMSc 7–8, 9P–11P; AmMWSc 12P–13P; WhoAmW 3–8; WhAm 10. "Mary K. Landers, 85, Former Math Professor." *New York Times*, 21 Nov 1990.

Other sources: PhD dissertation vita 1942; private communication with Robert K. Landers, Dec 2005 and Jan 2006; Brown University Archives (R. G. D. Richardson Papers); "City University asks $104,470,000," *New York Times*, 20 Nov 1964; US Census 1920, 1930 MA.

Last modified: December 13, 2008.

LAREW, Gillie A. July 28, 1882–January 2, 1977.
Randolph-Macon Woman's College (BA 1903), University of Chicago (MS 1911, PhD 1916).

Gillie Aldah Larew was born near Newbern, in Pulaski County, Virginia, the daughter of Gillie Augusta (Glendy) (1846–1887) and Isaac Hall Larew (1840–1904), both natives of Virginia. Her father had served as a captain in the Confederate army during the Civil War. Her parents married on February 12, 1867. She had four older siblings, John Glendy (1869–1876), Mary Alma Lyle (1872–1875), Cyrus Guy (1875–1908), and Robert Joseph (1877–1880), only one of whom was living at the time of her birth; she also had a younger sister, Julia (b. 1884). Her father was a farmer and a lawyer; he married a second time in about 1890 and had five more children. A later tribute indicated that she was "reared in a Christian home in an atmosphere of liberal Presbyterianism" and that "the place in the family's daily worship given to the great hymns of the Church and the Christian message" was important to her (Lipscomb 1953, 34).

Gillie Larew received her primary and secondary education from private tutors before entering Randolph-Macon Woman's College in Lynchburg, Virginia, in September 1899, near the end of the college's first decade. (The college was renamed Randolph College in July 2007 and became coeducational in September 2007.) Immediately after Larew's graduation in 1903 she became an instructor in mathematics there. She attended courses in the mathematics department at the University of Chicago in the summers of 1906 and 1909 and in the spring and summer quarters of 1911. She wrote her master's thesis in mechanics to complete the work for her master's degree in 1911.

Larew continued at Randolph-Macon Woman's College, except for leaves, for the remainder of her career. Having been made adjunct professor in 1909, she returned to the University of Chicago for seven quarters during the years 1914–16. She was a fellow in 1915–16, wrote her dissertation in the calculus of variations, and received her PhD in 1916. She returned to Randolph-Macon Woman's College and was promoted to associate professor in 1918 and to professor in 1921. She served as acting head of the department for a year in the early 1920s.

Apparently at the suggestion of G. A. Bliss, Larew's dissertation advisor, she spent the year 1929–30 in Munich studying mainly with Carathéodory. In 1936 she became head of the department at Randolph-Macon and remained so until 1950, when that position went to M. Gweneth Humphreys, who had been hired from Newcomb College the year before, when Larew had become dean of the college. Larew became dean emeritus and professor emeritus upon her retirement in 1953, at age seventy. After her retirement she served on the college steering committee and helped with the alumnae development program. In 1952, shortly before her retirement, she presented her personal philosophy on the Edward R. Murrow radio program "This I believe." These views appeared the following year in an article, "But as for me. . . ," in the *AAUW Journal*. The article was described as: "A fellow Virginian borrows Patrick Henry's famous words to introduce some thoughts on nonconformity" (**1954**, 3).

Larew was active in a number of professional organizations. In the 1920s she served as secretary of the Mathematics Section of the Virginia Educational Conference. After joining the MAA as a charter member, she attended many national

meetings of the MAA and meetings of the Maryland-District of Columbia-Virginia Section, for which she was on the executive committee in the early 1930s and was chairman 1937–38; she served as regional governor from July 1945 to July 1947. Larew served on the research committee of the Virginia Academy of Science in the early 1940s and was elected to the council in 1945. She was also very active in the AAUW and served as president of the local branch in 1922 and president of the state division 1938–40. The biographical notes to Larew's 1954 article say that "her services to AAUW have been too numerous for listing here. She is presently a member of the Standards and Recognition Committee, having recently completed four years as Vice-President from the South Atlantic Region" (p. 3).

Larew's contributions to Randolph-Macon Woman's College were recognized in several ways. In 1948 the college alumnae association endowed the Gillie A. Larew Chair of Mathematics. In June 1953 she was awarded the honorary degree of Doctor of Humane Letters by the college, and that month's issue of the *Alumnae Bulletin* was dedicated to her. In 1968 the Gillie Aldah Larew Distinguished Teaching Award was established by a member of the class of 1916 and her husband. An obituary in the *Alumnae Bulletin* noted that she was "the first alumna to be made a full professor at R-MWC, ... the first alumna to head a department at the College, ... [and] the first person to receive an honorary degree ... from the R-MWC" ("We Mourn Dr. Gillie A. Larew").

Gillie Larew died at her home in Lynchburg, Virginia, in 1977. She was ninety-four. She was survived by two half-sisters, nieces, and nephews, and was buried in the Larew Cemetery near her birthplace in Pulaski County, Virginia.

Organizational affiliations: AMS, MAA (charter member), AAAS, AAUW, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1911 case of constrained motion on a right circular cone. MS thesis, University of Chicago, directed by William Duncan MacMillan. Typescript.

1916 Necessary conditions in the problem of Mayer in the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Private edition, 1919, distributed by the University of Chicago Libraries, reprinted from *Trans. Amer. Math. Soc.* 20:1–22.

Publications:

1919 Necessary conditions in the problems of Mayer in the calculus of variations. *Trans. Amer. Math. Soc.* 20:1–22. Published version of PhD dissertation. Review: *JFM* 47.0477.02 (H. Hahn). Presented by title to the AMS, New York City, 26 Oct 1918; abstract: *Bull. Amer. Math. Soc.* 25:146–47 #3.

1924 The Hilbert integral and Mayer fields for the problem of Mayer in the calculus of variations. *Trans. Amer. Math. Soc.* 26:61–67. Reviews: *JFM* 50.0338.03 (H. Hahn); *Rev. semestr. publ. math.* 32, pt. 1: 12 (P. Mulder). Presented to the AMS, New York City, 28 Dec 1920; abstract: *Bull. Amer. Math. Soc.* 27:256 #21.

1932 Current tendencies in the curriculum and the method of instruction of the American College. *Bull.* (Randolph-Macon Woman's College) 19 (1): 1–9. Presented to the Virginia state convention of the AAUW, Mar 1931.

1942 The Committee on Research of the Virginia Academy of Science. *Alumnae Bull. Randolph-Macon Woman's College* 36 (1): 16–17.

1954 But as for me.... *AAUW J.* 48 (1): 3–7.

Abstracts not listed above:
1930 Discontinuous solutions for the anormal case of the Lagrange problem in the calculus of variations. *Bull. Amer. Math. Soc.* 36:808 #432. Presented to the AMS, Cleveland, OH, 31 Dec 1936.
1932 Some applications of Carathéodory's method of geodetic equidistance. *Amer. Math. Monthly* 39:4 #4. Presented to the MAA, Richmond, VA, 9 May 1931.

Presentations not listed above:
Minimum requirements in college mathematics from the standpoint of actual practice in Virginia and from that of an ideal curriculum. Presented to the Virginia State Teachers Assoc., Richmond, 28 Nov 1923.
A historical summary of the work of the section for the past five years. Presented to the Virginia Educ. Conf., Richmond, 27 Nov 1924.

References to: AmMSc 4–8, 9P–10P; AmWom 1935–40.
Lipscomb, Herbert C. "To Miss Larew, June 6, 1953." *Randolph-Macon Woman's College Alumnae Bull.* June 1953, 33–36. Reprinted as "No Finer Tribute." *Alumnae Bull.* (Randolph-Macon Woman's College) 70 no. 2 Winter 1977, 30–31.
"Math Professor: Dr. Gillie A. Larew, Retired R–M Dean, Dies." *Lynchburg (VA) News*, 3 Jan 1977.
"Larew." (Obituary) *Roanoke (VA) Times*, 4 Jan 1977.
"We Mourn Dr. Gillie A. Larew, Dean Emeritus and Professor of Mathematics." *Alumnae Bull.* (Randolph-Macon Woman's College) 70 no. 2, Winter 1977, 29.

Other sources: MS thesis vita 1911; PhD dissertation vita 1919; University of Chicago Archives; communications with Margaret A. M. Murray and with Randolph College Alumnae Office; US Census 1880, 1900, 1910, 1920, 1930 VA.

Last modified: August 5, 2009.

LEHR, Marguerite. October 22, 1898–December 14, 1987.
Goucher College (BA 1919), Bryn Mawr College (PhD 1925).

Anna Marguerite Marie Lehr was born in Baltimore, Maryland, the eldest of five children of Margaret (Kreuder) (b. 1871) and George Lehr (b. 1870). Her mother was born in Maryland, and her father was born in Germany. Her father immigrated to the United States in 1890 and was naturalized in 1912; he was a grocer. Her siblings were Elizabeth (1900–1985), Charlotte (ca. 1905–1967), Charles G. K. (1908–1993), and George K. (1911–1996). In the 1930 census their occupations were listed as instructor in a school, librarian, draftsman, and bookkeeper, respectively.

Marguerite Lehr received her primary and secondary education in the public schools in Baltimore and graduated from Western High School. She entered Goucher College in 1915 and graduated in 1919. Lehr wrote in 1934 that she had planned to continue her studies at Johns Hopkins University "until [an] instance of Dr. [Clara Latimer] Bacon's unceasing interest in the careers of all her students changed that plan more radically than she (I think!) or I foresaw" ("Clara Latimer Bacon," 3). Bacon suggested she apply for a position at Bryn Mawr College as an assistant to Charlotte Scott. She spent her first two years at Bryn Mawr, 1919–21, as a reader and graduate student, half time in each position. Patricia Kenschaft indicated in her 1981 article with interview excerpts that Lehr had graded papers and held office hours for Scott, the latter because Scott was deaf. Although Lehr was awarded the M. Carey Thomas European fellowship for 1921–22, she postponed using it and remained at Bryn Mawr as a resident fellow in mathematics that year and as a scholar in mathematics 1922–23. She spent the year 1923–24 in Rome as an AAUW European fellow and as an M. Carey Thomas European fellow. While in Rome she worked on her dissertation and studied with Guido Castelnuovo, Federigo Enriques, and Vito Volterra. Soon after she returned from Italy in July 1924, she began her long career on the faculty of Bryn Mawr as an instructor. She received her PhD in 1925 with a physics minor and was the last student of Charlotte A. Scott.

In 1929 Lehr was promoted from instructor to associate. She was promoted to assistant professor in 1935, associate professor in 1937, professor in 1955, and retired as professor emeritus in 1967. In response to a question about obstacles in her career, Lehr wrote on her 1970 Bryn Mawr alumni survey that "Only at B.M., with its full graduate school, would a woman of my generation, in mathematics, have had graduate level courses to give, from the first – regardless of rank. My engagement was with mathematics, not 'teaching,' consequently I refused any & all feelers in administration or editing in spite of slow promotion! But the choice was mine – I wanted the full range of thought, live, not text-book concerns."

Lehr was an honorary fellow at the Johns Hopkins University 1931–32, her first sabbatical year, and published two more articles in algebraic geometry, one of which was coauthored by Virgil Snyder of Cornell University. During World War II she taught mathematics needed to produce maps using photographs in an engineering science and management war training program at Bryn Mawr; she also taught mathematics in a V-12 program at Swarthmore College. During the late 1940s and into the 1950s, Lehr often attended meetings of the Institute of Mathematical Statistics. In 1950, during her second sabbatical, she visited the Institut Poincaré in Paris. During the first semester of 1952–53, she presented a fifteen-week course, "Invitation to Mathematics," on the television show "University of the Air" in

Philadelphia. This led to several articles, including one in the *Monthly*; to talks on presenting mathematics on television; and to her membership on the MAA committee on films for classroom instruction. In 1954 she was a curriculum consultant for the state of Pennsylvania. In 1956–57 she was a visiting fellow at Princeton University. In 1958–59 she was chair of the Philadelphia Section of the MAA and was an MAA visiting lecturer; as such she presented talks at various colleges in Iowa, Massachusetts, Michigan, Minnesota, New Hampshire, New York, and Ohio. From 1957 until 1966 she served on a regional award committee of the Woodrow Wilson Fellowship Foundation. She was a member of the School Mathematics Study Group at Yale University, was an MAA representative to the NSF, and was a member of the examining committee on the new type of mathematics for the College Entrance Examination Board. She also gave talks to many Bryn Mawr alumnae groups. In 1954 Lehr received a Goucher alumnae achievement citation, and upon her retirement from Bryn Mawr in 1967 she received the Lindback Foundation teaching award.

In addition to her year in Rome in 1923–24, Lehr made at least four more trips to Europe; ship records indicate that she returned from Europe in September in 1928 and 1932 and in August in 1938 and 1950. For a 1961 Bryn Mawr Alumnae Association survey, Lehr listed some of her "general interests and activities" as poetry, including "attempts at translation from Fr[ench], Germ[an], Ital[ian]," "upholstering and other house projects (some of which do oddly have a math side, too), not a bad carpenter," and gardening in Maine, where she spent many summers. In 1968, the year after she retired, Lehr was living in Salisbury, Maryland, where her sister Charlotte had been living until her death after a lengthy illness in August 1967. In May 1971 Lehr reported to Bryn Mawr from Baltimore that "I am gone from Salisbury a great deal." Part of that time is likely to have been in Manset on Mount Desert Island in Maine, which she described for her 1954 article in the *Bryn Mawr Alumnae Bulletin*, as "next to Mathematics, her greatest obsession" (p. 9, caption).

In November 1972, Marguerite Lehr moved from Salisbury back to Bryn Mawr, Pennsylvania. She died there in 1987 at the age of eighty-nine. A memorial service was held in the Episcopal Church of the Redeemer in Bryn Mawr, where she had been active, and burial was in Baltimore. In 1988 the Marguerite Lehr Scholarship Fund was established at Bryn Mawr. The fund was made possible through gifts from her former students and friends and is for undergraduates with need who have done excellent work in mathematics.

Organizational affiliations: AMS, MAA, IMS, Soc. Math. France, Biometric Soc., AAAS (fellow), AAUW, AAUP, Phi Beta Kappa, Sigma Xi.

Dissertation:

1925 The plane quintic with five cusps. PhD dissertation, Bryn Mawr College, directed by Charlotte Angas Scott. Printed version, 1927, reprinted from *Amer. J. Math.* 49:197–214.

Publications:

1927 The plane quintic with five cusps. *Amer. J. Math.* 49:197–214. Published version of PhD dissertation. Review: *JFM* 51.0620.03 (E. A. Weiss). Presented to the AMS, Washington, DC, 29 Dec 1924; abstract: *Bull. Amer. Math. Soc.* 31:209–10 #6.

1928 with D. Agassiz. *La Cathédrale: L'Eglise St-François*. Lausanne, France: SPES. Pamphlet with poems by Lehr and illustrations by Agassiz.

1931 with V. Snyder. Generating involutions of infinite discontinuous Cremona groups of S_4 which leave a general cubic variety invariant. *Amer. J. Math.* 53:186–94. Reviews: *JFM* 57.0797.05 (F. Schaale); *Zbl* 001.15903 (E. A. Weiss). Presented as "Generating

involutions of infinite discontinuous Cremona groups of S_4 which leave V_3 invariant" to the AMS, Bethlehem, PA, 26 Dec 1929; abstract: *Bull. Amer. Math. Soc.* 36:191 #91.
1932 Regular linear systems of curves with singularities of a given curve as base points. *Amer. J. Math.* 54:471–88. Reviews: *JFM* 58.0689.03 (H. Kneser); *Zbl* 004.36305 (B. L. van der Waerden).
1934 Clara Latimer Bacon. *Goucher Alumnae Quart.* 12 (4): 3–4.
1940 The right to think. *AAUW J.* 33 (3): 152–54.
1941 Review of *Elementary Mathematical Concepts*, by J. H. Zant and A. H. Diamond. *Amer. Math. Monthly* 48:548–49.
1949 Foreword. In *Children Discover Arithmetic: An Introduction to Structural Arithmetic*, by Catherine Stern, xv–xxi. New York: Harper & Brothers. Also London: Harrap, 1953.
1954 A television program in mathematics. *Bryn Mawr Alumnae Bull.* (Fall): 8–9.
1955 An experiment with television. *Amer. Math. Monthly* 62:15–21.
1956 Of dice and men. *Goucher Alumnae Quart.* (Fall): 10–13. Presented to the Seven Colleges Program, Detroit, MI, Oct 1955.
1958 *Eight Topics: Interplay between the Fields of Algebra, Geometry and Probability.* (Pamphlet) Mathematical Association of America.
1961 Mathematics: A bibliography prepared especially for alumnae. *Bryn Mawr Alumnae Bull.* (Winter): 5.
1969 Review of *Analyse statistique du style*, by H. H. Somers and S. J. Louvain (Editions Nauwelaerts). *J. of Biblical Literature* 88:246–47.
1971 Charlotte Angas Scott. In *Notable American Women: A Biographical Dictionary, 1607–1950*, ed. Edward T. James, 3:249–50. Cambridge, MA: Belknap Press of Harvard University Press.
1983 with G. S. Quinn, R. S. McKee, and O. Taussky. Emmy Noether in Bryn Mawr. In *Emmy Noether in Bryn Mawr,* eds. Bhama Srinivasan and Judith Sally, 139–146. New York: Springer-Verlag. Review: *Zbl* 557.01012 (I. Schneider). Presented as part of "Emmy Noether at Erlangen, Göttingen, and Bryn Mawr," panel discussion at AWM Symposium in Honor of Emmy Noether's 100th Birthday, Bryn Mawr, PA, 18 Mar 1982.

Abstracts not listed above:
1933 On curves with assigned singularities. *Amer. Math. Monthly* 40:64 #3. Presented to the MAA, Swarthmore, PA, 26 Nov 1932.
1945 Mapping problems in aerial photography. *Amer. Math. Monthly* 52:234 #1. Presented to the MAA, Philadelphia, PA, 2 Dec 1944.
1955 with F. G. Bender and R. F. Jackson. Mathematics through the television lens. *Amer. Math. Monthly* 62:302 #2. Presented to the MAA, Princeton, NJ, 27 Nov 1954.

Presentations not listed above:
Mathematics on television (demonstration and discussion). Discussant at meeting of the MAA, Pittsburgh, PA, 30 Dec 1954.
A little mathematics of the multiplication table variety. Presented to the MAA, Haverford, PA, 23 Nov 1963.
A human attitude. Presented to the NCTM, New York City, 15 Apr 1966.
Parades and geometry. Presented to the MAA, Towson, MD, 23 Nov 1968.
Presentation to the MAA of work by young mathematicians with whom she corresponded, Baltimore, MD, 24 Apr 1971.

References to: AmMSc 4–8, 9P–11P; AmWom 1935–40; BiDWSci; BioWMath; WhoAmW 5–6; WhoEast 1930.
Denckla, Martha Bridge. "Miss Lehr Retires." *Bryn Mawr Alumnae Bulletin* (1966–67) (4): 13–14.

Kenschaft, Pat. "An Interview with Marguerite Lehr." *AWM Newsletter* 11 (Jul–Aug 1981): 4–7. Reprint: "An Interview with Marguerite Lehr: In Memoriam." *AWM Newsletter* 18 (Mar–Apr 1988): 9–11.

Other sources: PhD dissertation vita 1937; Owens questionnaire 1937; Bryn Mawr College alumnae files; Maltby, *History of the Fellowships*; Cockey, "Mathematics at Goucher"; Kenschaft, "The students of Charlotte Angas Scott"; US Census 1900, 1910, 1920, 1930 MD; SSDI.

Last modified: January 22, 2016.

LESTER, Caroline A. April 6, 1902–December 29, 1996.
Cornell University (BA 1924, MA 1928), University of Wisconsin (PhD 1937).

Caroline Avery Lester was born in Seneca Falls, New York, the daughter of Elizabeth (Campbell) (1868–1943), originally of Racine, Wisconsin, and Frederick William Lester (1870–1947) of Seneca Falls. Her mother had attended a school for young ladies in New York City, and her father, a surgeon, had received his MD from Columbia University in 1894. Her parents married in 1897. Other children of the marriage were Lora (1898–1984), a bacteriologist with a BA from William Smith College; John Campbell (1900–1984), a graduate of the US Naval Academy who retired as a rear admiral and then taught engineering at Penn State; and Agnes (1905–2000), who earned a BA from Cornell University in 1926.

Lester attended the First Ward School and the Mynderse Academy, public schools in Seneca Falls, from kindergarten until her high school graduation in 1920. Years later, in 1985, she reported that her first motivation to pursue an education in mathematics came from a high school teacher, Miss Reamer, who had studied engineering at Cornell. Lester majored in mathematics at Cornell University, which she attended on a free tuition scholarship from New York State. In 1924, the year of her graduation, she was elected to Pi Lambda Theta, a national honor and professional association in education, and to Phi Kappa Phi, a national honor society for all disciplines. After her graduation she taught for three years in high schools in New York State. During the summer of 1925 she studied education at Harvard University. In 1927 she returned to Cornell and enrolled with an intended mathematics major and an education minor. At the end of the academic year she received her master's degree in mathematics.

In 1929 Lester went to the New York College for Teachers (now the State University of New York at Albany) as an instructor and remained there except for subsequent leaves. She continued her graduate work in mathematics at the University of Chicago in the summers of 1933 and 1934 and was particularly motivated by A. A. Albert in algebra. Expecting to have a sabbatical leave for the year 1935–36, she applied to return to Cornell. Although accepted by Cornell, Lester decided not to return there. Instead, she went to Ohio State University in the summer of 1935 to work under C. C. MacDuffee and then followed him to the University of Wisconsin. She studied at Wisconsin the next two years while on leave from her job and completed her work for the PhD under MacDuffee's direction in 1937 with a major in algebra and a minor in analysis. Lester traveled in Germany in the summer of 1937 and then returned to her position in Albany, where she was promoted to assistant professor by 1939 and to professor in 1950; she retired as emeritus professor in 1967. While at SUNY Albany, she produced manuscripts on "Modern Views of Mathematics – Lectures on Groups, Rings and Fields" and on the "Theory of Matrices."

Lester was on leave from her position at Albany 1943–45, when she was a lieutenant in the United States Coast Guard (Women's Reserve). In a 1990 interview, Lester described her entry into the military during World War II: "I was invited to join the WAVES, but was turned down because of the physical exam. So, I turned to the Coast Guard and was examined by a different doctor and was found to be in perfect health." Commissioned in February 1943, she attended the US Coast Guard

Academy for a three-week course and then was stationed at the Naval Communications Annex in Washington, D.C., as a specialist in cryptanalysis from March 1943 through September 1945. She reported in her 1990 interview that she "decoded messages from Spain, Portugal and North Africa."

In May 1940 Lester was one of forty-three MAA members to petition for the formation of a section for upstate New York. Lester served as vice chairman of the Upper New York State Section, now called the Seaway Section, 1957–58 and as chairman 1958–59. She was the second woman to serve in these positions; Harriet Montague had been the first. From 1948 to 1951 Lester served as an associate editor of the *American Mathematical Monthly*.

In the early 1980s Lester moved to Indianapolis, Indiana, where her younger sister was located. Lester was a member of the DAR, the National Society of Colonial Dames of America, and the Mayflower Society. She was a Republican and a member of a Presbyterian church and was especially interested in travel and bridge. Her travels included at least four trips to Europe and two to Central America. Caroline Avery Lester was ninety-four when she died in Indianapolis in 1996. She is buried in the Restvale Cemetery in Seneca Falls, New York.

Organizational affiliations: AMS, MAA, NCTM, Sigma Xi, Phi Beta Kappa.

Thesis and dissertation:

1928 Generalized trigonometric functions. MA thesis, Cornell University, directed by Walter Buckingham Carver. Typescript.

1937 A determination of the automorphisms of certain algebraic fields. PhD dissertation, University of Wisconsin, directed by Cyrus Colton MacDuffee. Typescript. Summary: *Summaries of Doctoral Dissertations, University of Wisconsin* 2:127. See also **1938**.

Publications:

1938 A determination of the automorphisms of certain algebraic fields. *Duke Math. J.* 4:277–90. Published version of PhD dissertation. Reviews: *JFM* 64.0136.06 (L. Holzer); *Zbl* 19:49 (O. Taussky). Presented to the AMS, New York City, 30 Oct 1937; abstract: *Bull. Amer. Math. Soc.* 43:628 #370.

1940a Review of *College General Mathematics for Prospective Secondary School Teachers*, by L. E. Boyer. *Amer. Math. Monthly* 47:103–04.

1940b Review of *Mathematico-Deductive Theory of Rote Learning. A Study of Scientific Methodology*, by C. L. Hull, C. I. Hovland, R. T. Ross, M. P. Hall, D. T. Perkins, and F. B. Fitch. *Amer. Math. Monthly* 47:701–03.

1940c Review of *Modern Elementary Theory of Numbers*, by L. E. Dickson. *Bull. Amer. Math. Soc.* 46:388–89.

1940d Review of *Outline of the History of Mathematics*, by R. C. Archibald. *Amer. Math. Monthly* 47:43.

1942 Review of *The Dozen System*, by G. S. Terry. *Amer. Math. Monthly* 49:187.

Presentation not listed above:

Algebra through the ages. Presented to the NCTM, Hartford, CT, 11 Nov 1966.

References to: AmMSc 8, 9P–11P.

Wooster, Kenneth. "Caroline A. Lester, Founder and Former Chair." *Seaway Current* 21, no. 1 (Fall 1997): 11.

Unpublished interview:

Dr. Caroline Avery Lester. Interview by Agnes L. Wade, Indianapolis, IN, 22 October 1990. NSCD Collection. Tape and transcript deposited at the Women's Memorial Foundation, Arlington, VA. Excerpt.

Other sources: PhD dissertation vita 1937; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1985; Division of Rare and Manuscript Collections, Cornell University Library; US Census 1910, 1920, 1930 NY.

Last modified: July 20, 2009.

LeSTOURGEON, Elizabeth. June 1, 1880–February 6, 1971.
Georgetown College (BA 1909), University of Chicago (MA 1913, PhD 1917).

Flora Elizabeth LeStourgeon (also "Le Stourgeon") was born in Farmville, Virginia, the daughter of Elizabeth Mary (Vinyard) (1854–1908) and Frederick George LeStourgeon (1846–1904). Her father was born in Illinois and her mother in New Jersey; they married in 1875 in Bridgeton, New Jersey. After their marriage her father farmed and operated canning companies in and near Farmville. Elizabeth LeStourgeon was the third child of seven; her siblings were: William George (1876–1955), Annie Emily (1878–1951), Charles James (1882–1918), Arthur Lloyd (1886–1958), Sarah Couth (1887–1970), and Percy Earl (1984–1977).

According to her master's thesis educational brief, LeStourgeon received her primary and secondary schooling in the Virginia State Normal School (officially the State Female Normal School at Farmville, now Longwood University) and remained a year in post-graduate study. Normal School catalogues indicate that she graduated from the regular course with a full diploma in 1897 and remained 1897–98 as an irregular student. She had teaching positions for the next several years including in the public school in Bridgeton, New Jersey, from 1898 to 1901; in the Waynesboro, Virginia, public school starting in 1901; and at St. Katharine's School in Bolivar, Tennessee, from at least 1906.

LeStourgeon studied several summers at the University of Virginia after it established a summer program primarily for public school teachers in 1907. Although this program allowed women to attend classes during the summer, it did not grant any course credit to the women participants. LeStourgeon then entered Georgetown College in Kentucky in September 1908 at age twenty-eight. After one academic year there she received her bachelor's degree. She took additional course work in 1909–10 and also taught in the preparatory department 1908–10. Her brother Percy took some courses at Georgetown College 1909–11.

LeStourgeon was a professor of mathematics at St. Mary's College, then an Episcopal college for women in Dallas, Texas, 1910–12. She studied at the University of Chicago during the summer quarters of 1911 and 1912 and for three quarters in 1912–13 as a holder of a scholarship in mathematics. Her master's thesis, completed in June of 1913, was written under the direction of A. C. Lunn. For her master's work, she took courses with H. E. Slaught, G. A. Bliss, E. J. Wilczynski, and A. C. Lunn in mathematics and with Kurt Laves in astronomy.

LeStourgeon spent the next two years, 1913–15, teaching mathematics at Beaver College in Pennsylvania, then a women's college (now coeducational Arcadia University), before returning to the University of Chicago to complete her doctoral work. She held a fellowship during the year 1916–17 and wrote her dissertation in the calculus of variations under the direction of Bliss. In his 1972 book on the history of mathematics, Morris Kline observed that, "so far as the basic definitions of properties of functionals needed for the calculus of variations are concerned, the final formulations were given by Elizabeth Le Stourgeon" in the paper based on her dissertation (p. 1080). E. J. McShane had mentioned this work earlier in the published version of his 1938 address on the calculus of variations at the semicentennial celebration of the American Mathematical Society.

After receiving her doctorate in 1917, LeStourgeon taught at the Liggett School for Girls in Detroit. She was an instructor at Mount Holyoke College for the year

1918–19 and an assistant professor at Carleton College the following year. In 1920 she went to the University of Kentucky, where she was assistant professor 1920–26 and associate professor 1926–46. She had leaves of absence during the years 1927–28 and 1944–45. She was in Europe in the summer of 1928. Her youngest brother, Percy Earl LeStourgeon, was stationed at the University of Kentucky as assistant professor of military science 1929–35.

While at the University of Kentucky she often spoke to and served as an officer of the White Mathematics Club and the Pi Mu Epsilon chapter. She was a member of the Kentucky Academy of Science. In about 1940 LeStourgeon was active in a number of organizations including AAUW and AAUP and described herself as an Episcopalian and a Democrat. In June 1941 she recovered from injuries suffered in an automobile accident in Kentucky as she and a colleague in romance languages started for summer vacations in Mexico.

In 1948 and 1950 LeStourgeon listed her address in the AMS membership list as Delray Beach, Florida. By 1952 she was living in Washington, D.C., but apparently continued to spend winters in Florida. By the early 1960s she had moved to Bridgeton, New Jersey, where several relatives lived. Flora Elizabeth LeStourgeon had been a member of AMS fifty-nine years at the time of her death at age ninety in 1971. She died at Bridgeton Hospital, where she had been a patient for four days. She was survived by one brother and many nieces, nephews, and cousins, and is buried in Overlook Cemetery in Bridgeton.

Organizational affiliations: AMS, MAA (charter member), AAAS, AAUW, AAUP, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1913 The relation of discontinuities to certain infinite series in the potential theory. MA thesis, University of Chicago, directed by Arthur Constant Lunn. Typescript.
1917 Minima of functions of lines. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Private edition, 1920, distributed by the University of Chicago Libraries, reprinted from *Trans. Amer. Math. Soc.* 21:357–83.

Publication:
1920 Minima of functions of lines. *Trans. Amer. Math. Soc.* 21:357–83. Published version of PhD dissertation. Review: *JFM* 47.0383.01 (E. Hellinger) 47:383. Presented by title to the AMS, New York City, 30 Oct 1920; abstract: *Bull. Amer. Math. Soc.* 27:100 #3.

Abstracts not listed above:
1922 Infinite series in the theory of potential. *Amer. Math. Monthly* 29:189 #2. Presented to the MAA, Georgetown, KY, 8 Apr 1822.
1927 Some remarks on functional calculus. *Amer. Math. Monthly* 34:173 #1. Presented to the MAA, Berea, KY, 8 May 1926.
1930 Queen Dido's problem. *Amer. Math. Monthly* 37:400 #7. Presented to the MAA, Lexington, KY, 15 Apr 1930.

References to: AmMSc 5–7; AmWom 1935–40.
"Dr. LeStourgeon Deceased at 90." *Bridgeton (NJ) Evening News*, 8 Feb 1971.
"Dr. Le Stourgeon Dies in New Jersey." *Lexington (KY) Leader*, Feb 1971.

Other sources: Master's thesis educational brief 1913; Center for Research Libraries College Catalog Collection; San Antonio Public Library; communications with Bridgeton (NJ) Public Library, Georgetown College Archives, Longwood University Archives, and with University of Kentucky Archives; Graham Meredith LeStourgeon and Lawrence Fontaine LeStourgeon, *The LeStourgeon Family Book* (Columbus, Ohio: 1989); E. J. McShane, "Recent Developments in the Calculus of Variations," in *Semicentennial Addresses of*

the American Mathematical Society (New York: American Mathematical Society, 1938), 69–97; Morris Kline, *Mathematical Thought from Ancient to Modern Times* (New York: Oxford University Press, 1972); *Women at the University of Virginia* "First Students" (exhibition); US Census 1880 VA, 1910 KY, 1920 MN, 1930 KY; New Jersey death certificate; SSDI.

Last modified: January 22, 2016.

LEWIS, Florence P. September 24, 1877–March 10, 1964.
University of Texas (BA 1897, MA 1898), Radcliffe College (MA 1906), Johns Hopkins University (PhD 1913).

Florence Parthenia Lewis was born in Fort Scott, Kansas, the daughter of Monimia (Chase) (ca. 1851–1923) and Walter Felix Lewis (1846–1903), who married in 1872. Her parents were both born in Missouri, and her paternal grandfather was a judge of the Supreme Court of Missouri. By the time of the 1900 census her mother had had seven children, six of whom were living. The children were Walter Howard (b. 1873), George Chase (b. 1876), Florence Parthenia, Francis Ann (b. 1884), Susan Elizabeth (1885–1967), Walter Felix (b. 1889), and Eugene Grayson (b. 1896). The six youngest were still living in 1900.

Lewis attended high school in Austin, Texas, and entered the University of Texas as a sophomore with advanced standing in 1894. When she entered she was in the group leading to a bachelor of literature; her last two years she was in the program leading to the bachelor of arts degree. Her first two years at the University of Texas she held the high school scholarship from Austin High School, which was given annually to the graduate of each affiliated high school with the highest standing in the class, and which carried with it exemption from all matriculation or tuition fees. Lewis graduated from the university in 1897; her obituary states that her degree was in classics. She later noted in her dissertation vita that when she received her degree "Dr. G. B. Halsted was professor of mathematics." In a 1922 obituary of Halsted by H. Y. Benedict, excerpted in the *Monthly*, Lewis is referred to as one of Halsted's "great pupils" (29:352).

Lewis remained at Texas 1897–98 as a graduate student with major subjects mathematics, philosophy, and pedagogy. Her master's degree in 1898 was awarded in philosophy. In a letter to E. F. Buchner of January 21, 1911, S. E. Mezes, then president of the University of Texas, described her work as his student during the year 1897–98 and noted that she did work in Greek and mathematics that year as well as in philosophy. Of her work in the philosophy courses he wrote that "one dealt with the history of Philosophy, and the other was a seminary course of an advanced character and, as nearly as I can remember, dealt with some fundamental logical problems. As to the quality of Miss Lewis' work, I can speak with certainty. No student I have taught had a better mind or more interest in Philosophy. I am not given to extravagance of statement, but if I were I would employ it with regard to her" (student files, The Ferdinand Hamburger Archives of the Johns Hopkins University).

After receiving her master's degree, Lewis spent the next year, 1898–99, as a fellow in philosophy at Bryn Mawr College. In 1899–1900 she was a traveling fellow from Bryn Mawr; she studied a half year at the Sorbonne and, during the summer quarter, at Zürich. Her work that year included lectures and reading on the philosophy of Spinoza by Lévy-Bruhl, study of Aristotle (in Greek), a Kant seminar, and some lectures on experimental psychology.

After Lewis's return from Europe, it appears that she taught for a year in Mississippi. She then returned to the University of Texas where she remained for the next four years. She was listed in the university catalogues as a graduate student in mathematics 1901–02, a graduate student and a tutor in mathematics 1902–03, and a tutor in mathematics 1903–05. For 1905–06, she was listed as a tutor

in mathematics, absent on leave. During that year she earned her master's degree in mathematics at Radcliffe College after which she returned to Texas for a final year as tutor in pure mathematics. As tutor in mathematics, Lewis taught regular mathematics courses. For example, her last year at Texas she taught an introductory mathematics course that included solid geometry, plane trigonometry, and algebra with an introduction to analytic geometry; she also taught algebra, which included theory of equations, determinants, symmetric functions, and theory of polynomials.

In 1907 the trustees of Johns Hopkins University voted to open graduate courses to women. In September of that year Clara Latimer Bacon and Florence Parthenia Lewis both applied for admission to the graduate program in mathematics at the Johns Hopkins University. Bacon, on the faculty at Woman's College of Baltimore (Goucher College after 1910) since 1897, became in 1911 the first woman to be granted a PhD in mathematics from Johns Hopkins. Lewis began her graduate studies at Johns Hopkins with mathematics as her major and the history of philosophy and psychology as subordinate subjects. She studied full time during 1907–08 and joined Bacon on the faculty at Woman's College as instructor in the fall of 1908. Lewis took two courses at Johns Hopkins in 1908–09, remained at Woman's College, and was again a full-time student at Johns Hopkins during 1911–12. In January 1911 Lewis made application for her PhD. A few days later the committee on instruction in the department of philosophy, psychology, and education accepted the records of advanced work previously done by her at Texas, Byrn Mawr, the Sorbonne, and Zürich. She received her PhD, the second granted to a woman in mathematics by Johns Hopkins, in 1913 with a dissertation in algebraic geometry written under the direction of Frank Morley.

When Lewis joined the mathematics faculty at Woman's College of Baltimore in 1908, the other faculty members were Bacon and William H. Maltbie. Maltbie, who had earned a law degree, left the following year to practice law. Except for brief appointments of instructors, Bacon and Lewis were the mathematics faculty until they were joined in 1925 by Marion M. Torrey, at that time a recent Cornell PhD. While Bacon and Lewis were on the Goucher mathematics faculty, nine women graduated who later received PhD's in mathematics, six from Johns Hopkins.

Except for two leaves of absence, Lewis spent her entire career at Goucher. She was promoted from instructor to assistant professor in 1912, to associate professor in 1914, to professor in 1922, and to professor emeritus upon her retirement in 1947. Lewis spent her second leave of absence in 1918–19 at Wellesley College in an exchange with Clara E. Smith. She was well respected in the mathematical community and served on the council of the AMS 1921–23, the first woman since Charlotte A. Scott last served at the turn of the century. She also was a member of the honorary committee that arranged a meeting in honor of Scott in 1922. Lewis served as chairman of the Goucher mathematics department from 1931 to 1943. In addition to teaching mathematics, she was responsible for the founding of Goucher's astronomy program within the mathematics department and maintained memberships in the American Astronomical Society and the Astronomical Society of the Pacific. In 1954, seven years after she retired, the six-inch refracting Florence P. Lewis telescope was installed at Goucher.

Lewis and Bacon were both charter members of the MAA, and for various periods from the early 1920s through the early 1940s, Lewis served on the executive committee of the Maryland-District of Columbia-Virginia Section of the MAA. During

the late 1910s and the early 1920s she regularly submitted problems, mostly in geometry, that were published in the *Monthly*. In 1932 she attended the International Congress of Mathematicians in Zurich. She also served on the executive committee and the council of the AAUP.

Lewis remained in Baltimore, except for trips abroad, after her retirement. She was able to live in her apartment until illness required that she be in a nursing home for several weeks before her death in Baltimore at eighty-six in 1964. In a memorial article in the *Goucher Alumnae Quarterly* in Spring 1964, Helen Dodson Prince, a former student and a distinguished astronomer at the University of Michigan, recalled the "experience in which we met a new-found joy in things of the mind and spirit ... [that] abounded in Dr. Lewis's classrooms. The source or cause of this special air I do not know, but I suspect it stemmed in large measure from Dr. Lewis's wide-ranging interests and curiosity. For her, all academic disciplines were fair game for personal inquiry and investigation." Prince also wrote, "Again and again I have found myself coming back to something that can perhaps best be described as 'sheer delight'–a delight that seemed to permeate her relationship with subject matter as well as with students."

Organizational affiliations: AMS, MAA (charter member), Amer. Astronom. Soc., Astronom. Soc. of the Pacific, AAAS, AAUP, Phi Beta Kappa.

Dissertation:

1913 A geometrical application of the theory of the binary quintic. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Typescript. Printed version, 1914, reprinted from *Amer. J. Math.* 36:333–56.

Publications:

1911 A geometrical application of the binary quintic. *Johns Hopkins Univ. Circular* 2:84–93. Review: *JFM* 42.0132.01 (F. Meyer).

1914 A geometrical application of the theory of the binary quintic. *Amer. J. Math.* 36:333–56. Published version of PhD dissertation. Reviews: *JFM* 45.0821.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 23, pt. 1: 3–4 (E. B. Cowley).

1920 History of the parallel postulate. *Amer. Math. Monthly* 27:16–23. Presented to the Assoc. Teachers Math. in New England, Boston, MA, 3 May 1919. Reprint: 1979. In *Selected Papers on Geometry*, ed. A. K. Stehny, T. K. Milnor, J. E. D'Atri, and T. F. Banchoff, 6–12. Mathematical Association of America.

1948 Clara Latimer Bacon: Aug. 23 [*sic*], 1866–April 14, 1948. *Goucher Alum. Quart.* (Spring): 19–22.

Presentations not listed above:

On the Missouri system of grading students. Presented to the MAA, Washington, DC, 14 May 1918.

With Dr. G. H. Cresse. Report of summer meeting of the Association at Ann Arbor, Mich. Presented to the MAA, Washington, DC, 6 Dec 1919.

Mathematical aspects of a theory of the frequency distribution of species. Presented to the MAA, Baltimore, MD, 10 May 1930.

References to: AmMSc 5–8, 9P–10P; BiDWSci.

"Telescope to Be Dedicated," *New York Times*, 17 Oct 1954.

"Dr. F. P. Lewis Funeral Set," *Baltimore Sun*, 12 Mar 1964.

Prince, Helen Dodson. "Florence P. Lewis." (Obituary) *Goucher Alumnae Quarterly*, Spring 1964, 18.

Other sources: PhD dissertation vita 1913; Center for Research Libraries College Catalog Collection (University of Texas catalogs); The Ferdinand Hamburger Archives of the Johns

Hopkins University; Cockey, "Mathematics at Goucher"; A. C. Lewis, *The Building of the University of Texas Mathematics Faculty*; US Census 1880 KS, 1900 TX, 1920 MO.

Last modified: March 8, 2009.

LITTLE, Dorothy (Manning) Smiley. October 6, 1909–October 18, 1988. Stanford University (BA 1933, MA 1934, PhD 1937).

Dorothy Manning was the eldest of five surviving children of Esther Mae (Crandall) (1883–1954), originally from San Francisco, California, and William Albert Manning (1876–1972), born in Salem, Oregon. Esther Crandall earned a bachelor's degree in 1903 and a master's degree in 1905 in Greek from Stanford and was a PhD student in psychology there at the time of her marriage in 1908. W. A. Manning spent a year in Nicaragua with a half-brother before beginning his undergraduate studies. He earned a bachelor's degree in 1900 from Willamette University in Salem, Oregon, and a master's degree in 1902 and a PhD in 1904 in mathematics from Stanford University. He studied at the Sorbonne during the year 1904–05 and then returned to the mathematics department at Stanford where, except for a visiting position, he spent the remainder of his career.

Esther Crandall and W. A. Manning were married on September 18, 1908, and made their home in Palo Alto. He had a visiting position at the University of Illinois in 1909–10, and it was in Champaign, Illinois, that Dorothy Manning was born. There were three more daughters: Rhoda (1912–2006), Helena (1914–1939), and Sylvia (1917–2005). Twin boys were born in 1920 but died shortly after birth. The surviving son, Laurence Albert, was born in 1923. The family moved from Palo Alto to the Stanford campus, an unincorporated area, in 1925.

Dorothy Manning attended public schools in Palo Alto and graduated in 1928 from Palo Alto Union High School. She entered Stanford in the fall of 1928, the year Marie Weiss received her doctorate in group theory as a student of W. A. Manning. Dorothy Manning was registered for two quarters in each of the last two of her five years as an undergraduate at Stanford and received her BA with great distinction as a chemistry major in April 1933. The following year she completed the work for her MA in mathematics, with a thesis in group theory written under the direction of her father. One year later, in June 1935, her PhD dissertation in group theory was approved by W. A. Manning and H. F. Blichfeldt, and, for the committee on graduate study, Ralph H. Lutz. Her dissertation, written under her father's direction, appeared in the *Transactions* of the AMS in 1936, the year before her degree was granted with a minor in chemistry. During the academic years 1935–36 and 1936–37 Dorothy Manning was an Abraham Rosenberg research fellow at Stanford.

Dorothy Manning's four siblings all attended Stanford. Rhoda entered in the fall of 1929 and Helena in the fall of 1931. Both studied mathematics and earned BA's in 1935 and MA's in 1937. Like their older sister, both wrote master's theses under the direction of their father. Helena died of sleeping sickness in November 1939 after an illness of about a year and a half. Rhoda continued her work at Stanford and earned a PhD in mathematics in 1941 under the direction of Gabor Szegö. She was for some time on the faculty at Oregon State University, where she met and married William H. Wood, a geologist. Sylvia Manning first enrolled at Stanford in the fall of 1935 and studied chemistry for three years. Laurence Manning entered Stanford in 1940 and earned all his degrees in electrical engineering: a BA in 1944, an MS in 1947, and a PhD in 1949. He became a professor of electrical engineering at Stanford.

Dorothy Manning studied at the University of Chicago 1937–38 as a holder of a prestigious National Research Fellowship; the following year she was a member of the Institute for Advanced Study in Princeton. In the fall of 1939 she became an instructor at Wells College in Aurora, New York, and resigned after two years. The notice of her resignation appeared in the August 1941 *Monthly* and included the information that she "has become the bride of Dr. M. F. Smiley of Lehigh University" (48:489).

On August 20, 1941, Dorothy Manning and Malcolm Finlay Smiley were married in Chicago. Smiley was born near Monmouth, Illinois, on December 15, 1912. He did all of his work through the doctorate at the University of Chicago; he earned a BS with honors in 1934, an MS in 1935, and a PhD in 1937, with a dissertation in the calculus of variations. He was a member of the Institute for Advanced Study in 1937–38. In 1938 he went to Lehigh University as instructor and was promoted to assistant professor before he left in 1942. He also taught as a visiting faculty member at Chicago for the summers of 1939 and 1941. There were no children of the marriage.

Dorothy Manning Smiley had no formal employment after her marriage, but M. F. Smiley was associated with a number of institutions. During World War II he was in the US Naval Reserve and taught at the Post Graduate School of the US Naval Academy. He returned to Lehigh as associate professor briefly after the war. He was at Northwestern University 1946–48, at the University of Iowa 1948–60, at the University of California at Riverside 1960–67, and at SUNY Albany from 1967 until his retirement in about 1980 or 1981. In 1954–55, he was a faculty fellow of the Fund for the Advancement of Education, and in 1975 he was an honorary research associate at Harvard. The focus of his research shifted from analysis to abstract algebra.

Dorothy Manning Smiley had earlier been elected to Phi Beta Kappa and was a member of Sigma Xi, a science honor society; Iota Sigma Pi, a chemistry honor society for women; and Sigma Delta Epsilon, an organization for graduate women in science. Long after her marriage she coauthored two mathematical papers, which appeared in the *Monthly* in 1964 and 1965. In a paper that appeared in the *Transactions* of the AMS in 1957, M. F. Smiley wrote, "It is with pleasure that the author acknowledges that certain conversations with his wife, Dorothy M. Smiley, aided materially in the derivation of the results given in this note" (84:426). He also acknowledged her "helpful suggestions" in a 1968 paper in the *Proceedings* of the AMS (19:1029, footnote). Dorothy Smiley retained her membership in AMS until the mid-1970s.

In a December 1997 e-mail to one of the authors, Dorothy Smiley was described by her brother, Laurence Manning, as "the smallest of her siblings (at 5'5"), and light boned." He noted that she "had a quiet orderly personality." He said that "she spoke quietly but very intelligently. She studied the violin as a child, but wasn't very good at it." He recalled, "Dorothy was 12 years older than I was, so during the time that we were at home together I was quite young. I used to look to her as equivalent to an encyclopedia. She seemed to know a lot about many things. My own interest in radio and electronics can probably be traced back to the seed that she planted by constructing our family's first radio. I remember hearing a bit of President Herbert Hoover's inauguration on her set."

The Smileys had several moves into new communities, but Dorothy Smiley's brother reported that, "she always got involved in local activities, usually quickly getting a position on some board or other." She also liked to paint, "and her pictures were carefully done, and most likely still lifes."

After 1967 the Smileys lived in the Albany area, and it was there that Malcolm F. Smiley died in July 1982, shortly after his retirement. After his death Dorothy Manning Smiley moved from her home to an apartment. Later she met Jess Edward Little, a retired chemist. On March 26, 1988, they were married in a Unitarian Church to which they both had connections. Less than seven months later, on October 18, Dorothy Manning Smiley Little died suddenly after suffering a massive heart attack at their home in Slingerland, New York.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1934 [Manning, D.] Concerning simply transitive groups of degree n that contain circular permutations of the n letters. MA thesis, Stanford University, directed by William Albert Manning.

1937 [Manning, D.] On simply transitive groups with transitive Abelian subgroups of the same degree. PhD dissertation, Stanford University, directed by William Albert Manning. Abstract: *Stanford University. Abstracts of dissertations for the degrees of doctor of philosophy and doctor of education, with the titles of theses accepted for the degrees of engineer, master of arts, and master of science.* 12:87–90.

Publications:

1936 [Manning, D.] On simply transitive groups with transitive Abelian subgroups of the same degree. *Trans. Amer. Math. Soc.* 40:324–42. Published version of PhD dissertation. Reviews: *JFM* 62.0087.03 (H. Wielandt); *Zbl* 015.00507 (W. Magnus). Presented as "On simply transitive permutation groups with transitive Abelian subgroups of the same degree" to the AMS, Palo Alto, CA, 6 Apr 1935; abstract: *Bull. Amer. Math. Soc.* 41:196 #154.

1964 [Smiley, D.] with M. F. Smiley. The polygonal inequalities. *Amer. Math. Monthly* 71:755–60. Reviews: *MR* 30 #1384 (E. R. Lorch); *Zbl* 173.15601 (R. von Randow).

1965 [Smiley, D.] with L. M. Kelly and M. F. Smiley. Two dimensional spaces are quadrilateral spaces. *Amer. Math. Monthly* 72:753–54. Reviews: *MR* 32 #345 (Editors); *Zbl* 125.34202 (H. Pachale).

Abstracts not listed above:

1937 [Manning, D.] On simply transitive groups with transitive Abelian subgroups of the same degree. II. *Bull. Amer. Math. Soc.* 43:202 #223. Presented to the AMS, Palo Alto, CA, 3 Apr 1937.

1938 [Manning, D.] On simply transitive groups with transitive Abelian subgroups of the same degree. III. *Bull. Amer. Math. Soc.* 44:642 #398. Presented to the AMS, New York City, 29 Oct 1938.

1942 [Smiley, D.] A note on Burnside's problem. *Bull. Amer. Math. Soc.* 48 (9, pt. 1): 665 #253. Presented by title to a meeting of the AMS, Poughkeepsie, NY, 8–10 Sep 1942.

Reference to: AmMSc 6.

Other sources: PhD dissertation abstract vita 1937; Owens questionnaire 1940; private communication with Laurence A. Manning, December 1997; Stanford University Archives; WhAm 5 (Manning, William Albert); WhoAm 40 (Smiley, Malcolm Finlay); US census 1910 IL, 1920, 1930 CA; SSDI.

Last modified: August 21, 2010.

LITZINGER, Marie. May 14, 1899–April 7, 1952.
Bryn Mawr College (BA 1920, MA 1922), University of Chicago (PhD 1934).

Marie Paula Litzinger was born in Bedford, Pennsylvania, the eldest of five children of Katherine (O'Connell) (1870–1948) and Rush C. Litzinger (1865–1927), both natives of Pennsylvania. Her father worked for the Pennsylvania Railroad as clerk, bookkeeper, and accountant. When the railroad moved its offices out of Bedford, he resigned his position and opened an insurance and real estate office there. The other children were Katherine (1902–1990), Margaret (b. ca. 1905), Rush C. Jr. (ca. 1906–1910), and Anna E. (b. ca. 1909).

Marie Litzinger attended elementary and secondary school in Bedford and graduated from high school in 1916. She then attended Bryn Mawr College 1916–23, where she received both her bachelor's and master's degrees. While there she held several scholarships; she was the James E. Rhoads sophomore scholar 1917–18, the first Charles S. Hinchman memorial scholar 1918–19, and the Maria D. Eastman Brooke Hall memorial scholar and Anna M. Powers memorial scholar 1919–20. In 1920 Marie Litzinger was awarded her BA in Latin and mathematics, magna cum laude. She was awarded the Bryn Mawr European fellowship and the Shippen foreign scholarship 1920–21, but did not study abroad until 1923. She also taught in the Devon Manor School in nearby Devon, Pennsylvania, during her two years as a master's student 1920–22. While at Bryn Mawr she studied with Olive C. Hazlett, Anna Pell Wheeler, and Charlotte A. Scott.

Litzinger was awarded a mathematics resident fellowship of $810 for additional graduate study at Bryn Mawr in 1922–23, the year after she received her master's degree. In addition to other work, she gave one talk each semester in the Mathematical Journal Club at Bryn Mawr. During the year 1923–24 she went to Europe and attended courses by G. Castelnuovo, F. Enriques, and V. Volterra at the University of Rome. The following year she taught at the Greenwich Academy in Greenwich, Connecticut.

Litzinger began her association with Mount Holyoke College in 1925. She was instructor 1925–28 and assistant professor 1928–37. During this period Marie Litzinger's sister Anna was a student at Mount Holyoke. Anna Litzinger graduated in 1931 with an honors paper in chemistry and received a master's degree in chemistry in 1933. Her sister Margaret attended Drexel Institute of Art, Science, and Industry in Philadelphia in the late 1920s.

During the years 1928 through 1934 Marie Litzinger was in residence for four quarters at the University of Chicago, one in autumn 1929 on a leave of absence from Mount Holyoke. She wrote her PhD dissertation at Chicago under the direction of L. E. Dickson and received her doctorate in 1934. Her dissertation was published in the *Transactions* of the AMS the following year.

In 1937 Marie Litzinger was promoted to associate professor and was made chairman of the department at Mount Holyoke. She remained department chairman and was promoted to professor in 1942. She held a chair in mathematics from the John Stewart Kennedy Foundation after 1948. While at Mount Holyoke, Litzinger notably strengthened the mathematics department. Among her college activities was work on the academic committee, the space advisory committee, and the advisory committee on appointments, reappointments, and promotions. She was also active in the Connecticut Valley Colloquium, the Mount Holyoke chapter of the AAUP,

and the Connecticut Valley section of the Association of Teachers of Mathematics in New England, where she served as secretary 1936–38, vice president 1939–40, president elect 1940–41, and then president. In 1942 she and B. H. Brown of Dartmouth prepared the questions for the fifth Putnam Competition. Litzinger joined the AMS shortly after she went to Mount Holyoke and almost immediately started attending meetings of the society. From 1934 through 1949, with the exception of one year, she attended at least one, and usually several, meetings a year; most were in New York City. Litzinger's entry in *Who Was Who in America (1951–1960)* indicates that she was a Democrat.

Litzinger traveled in France and Italy in the summer of 1951. She was forced by illness to take a leave of absence from the college in November that year. At that time she returned to Bedford, Pennsylvania, where her sister Katherine was a high school teacher. Marie Litzinger died several months later at age fifty-two. Her three sisters survived her. In a tribute after her death, Alzada Comstock, an economics colleague, recalled Litzinger's delicate humor, imaginative outlook, time for undergraduates, devotion to her family, and loyalty.

Organizational affiliations: AMS, MAA, AAUP, Sigma Xi.

Dissertation:
1934 A basis for residual polynomials in n variables. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, 1935, distributed by the University of Chicago Libraries, reprinted from *Trans. Amer. Math. Soc.* 37:216–25.

Publications:
1935 A basis for residual polynomials in n variables. *Trans. Amer. Math. Soc.* 37:216–25. Published version of PhD dissertation. Reviews: *JFM* 61.0085.04 (U. Wegner); *Zbl* 011.14804 (S. Lubelski). Presented by title to the AMS, New York City, 23 Feb 1935; abstract: *Bull. Amer. Math. Soc.* 41:191 #134.
1949 Real numbers for freshmen. *Math. Mag.* 22:263–64.

References to: BiDWSci, BioWMath, WhAm 3.
"Marie Litzinger, Educator, Was 52," *New York Times*, 8 Apr 1952.
"Marie Litzinger, 52, of Mt. Holyoke Staff," New York Herald-Tribune, 8 Apr 1952.
Comstock, Alzada. "Marie Litzinger: 1899–1952," *Mount Holyoke Alumnae Quarterly*, 36 (Aug 1952): 43.

Other sources: PhD dissertation vita 1935; Owens questionnaires 1937, 1940; Bryn Mawr College Archives; Mount Holyoke College Archives; Grinstein, "Some 'Forgotten' Women of Mathematics"; "Bedford Loses Prominent Citizen," (Rush C. Litzinger obituary) *Bedford* (*PA*) *Gazette*, 10 Jun 1927; "Mrs. Katherine Litzinger," (Obituary) *Bedford* (*PA*) *Gazette*, 17 Jun 1948; US Census 1900, 1910, 1920 PA, 1930 MA.

Last modified: March 8, 2009.

LOGSDON, Mayme (Irwin) February 1, 1881–July 4, 1967.
University of Chicago (BS 1912, MA 1914, PhD 1921).

Mayme Irwin was born in Elizabethtown, Kentucky, the daughter of Nan Belle (Farmer) (1857–1892) and James David Irwin (1852–1921), both of Kentucky. She was the second of five children from her father's first marriage; her brothers were William F. (1879–1944), Jessie C. (1884–1957), and Robert T. (b. 1888); her sister was Mary (1892–1981). There were three children from her father's second marriage in about 1894: Madge L. (b. 1895), Myrtle I. (b. 1897), and James D. Jr. (b. ca. 1906). Her father, a constable in Elizabethtown in 1880, became an attorney in 1883.

Mayme Irwin attended public primary and secondary schools and graduated from the Hardin Collegiate Institute, all in Elizabethtown, Kentucky. The Institute was primarily a preparatory school with a business course and a teachers' course, in which Irwin probably was enrolled. Although Logsdon wrote in her 1914 master's thesis vita that she had received a BA from Hardin, it is unlikely that the degree represented a four-year program.

Irwin was a high school teacher and principal from 1900 to 1911. On August 1, 1900, she married Augustus H. Logsdon (1859–1909), a businessman of nearby Munfordville. Logsdon had two children from his first marriage, Nell (b. ca. 1892) and Ollie Preston (1897–1990); there were no children from his marriage with Mayme Irwin. In 1910, the year after she was widowed, Mayme Logsdon and her stepchildren, then eighteen and twelve, were living with their aunt and uncle in Elizabethtown. Her stepson remained with an aunt in Elizabethtown, while her stepdaughter later moved to the west, where she married and lived in Wyoming.

Logsdon returned to school in 1911 at the University of Chicago, where she completed the work for her bachelor's degree in August of 1912. She began her graduate study there in 1912 and after a year took a position as the mathematics instructor and dean of women at Hastings College in Nebraska. After her first year there, 1913–14, she returned to Chicago for the summer and completed the courses and thesis for a master's degree. She remained at Hastings College as professor of mathematics and dean of women for three more years, 1914–17. While there she taught all of the mathematics courses, college algebra through differential and integral calculus.

Logsdon was an instructor at Northwestern University 1917–19 before resuming her graduate work at Chicago, as a fellow in 1919–20 and as an associate in 1920–21. After completing her doctorate at age forty in 1921, she remained at the University of Chicago as instructor 1921–25, assistant professor 1925–30, and associate professor 1930–46; she retired as associate professor emeritus in 1946.

Mayme Logsdon was the only woman to hold a regular faculty position above the rank of instructor in the Chicago mathematics department before 1982. In addition to her faculty duties, she served as a dean in the College of Science 1923–27 and was head of Kelly Hall, a graduate dormitory, for many years. Later she had a house built in Ogden Dunes in nearby northwestern Indiana and commuted to Chicago.

Although Logsdon was a student of L. E. Dickson, her interests shifted to algebraic geometry early in her career at Chicago. She sailed to Italy in June 1925 to study in Rome on a foreign fellowship granted by the International Education Board. Shortly before Logsdon returned from Italy in 1926, she gave a lecture in

Rome based on her 1925 paper in the *Transactions* of the AMS. As noted in his autobiography, *Apprentissage d'un mathematicien*, Andre Weil attended the lecture, and it was from the offprints of this paper that he learned of Mordell's work on elliptic curves. In his autobiography, Weil referred to Logsdon as "la jeune americaine" although at the time of her lecture he was nineteen and she was forty-five. In a private correspondence with one of the authors, Robert P. Langlands of the Institute for Advanced Study wrote, "I found Weil's treatment of her rather ungenerous, as she in fact put him on the trail of something important in his career.... [S]he recognized the interest and importance of the theorem of Mordell, and ... simply having drawn Weil's attention to it earns her a small place in the history of mathematics."

Logsdon resumed her duties at Chicago in October 1926. The following year she was appointed the MAA representative to the American section of the International Mathematical Union that was planning the 1928 International Mathematical Congress in Bologna. During the early 1930s she refereed papers submitted to the *Bulletin* and the *Transactions* of the AMS and presided at scientific sessions at meetings of that organization. At the University of Chicago, Logsdon regularly gave advanced courses in algebraic geometry and directed the PhD dissertations of four students in this area between 1933 and 1938. The students were Anna A. Stafford (Henriques) 1933, James Edward Case 1936, Clyde Harvey Graves 1938, and Frank Ayres, Jr. 1938. During this period she was also interested in undergraduate education, and, in addition to giving talks in that area, she wrote two textbooks. The two-volume *Elementary Mathematical Analysis*, which appeared in 1932 and 1933, is what might now be called an elementary functions or precalculus textbook; the 1935 *A Mathematician Explains* treats topics prerequisite to calculus and briefly introduces both differential and integral calculus. In a 1937 article about the mathematics curriculum in schools, her student Anna Stafford noted that *A Mathematician Explains* "is not the kind of book you expect the public to get excited about, but it is selling. When a news company orders twelve dozen copies you know it is not for any altruistic notions about aiding the the cause of science. People want to read that book" (p. 408).

Logsdon was a member of the Central Association of Teachers of Mathematics and Science, a charter member of the MAA and an MAA governor-at-large 1940–42. She also founded the Illinois section of Delta Kappa Gamma, an honorary society for women in education, and was active in Sigma Delta Epsilon (now Sigma Delta Epsilon/Graduate Women in Science), for which she was president in 1939 and received applications for fellowships in the early 1950s. She held offices in Chicago chapters of AAUW, Phi Beta Kappa, and Sigma Xi.

After her retirement in 1946 from the University of Chicago, Logsdon moved to Florida, where she taught mathematics at the University of Miami until her second retirement at age eighty in 1961. After living in Miami for a while, she had a house built in Coral Gables, where she lived until she moved to a nursing home. Logsdon was a Baptist and a Democrat. She was an avid bridge player, who traveled around the country to earn masterpoints. Her many international travels included trips to most of Europe, the Yucatan, the Caribbean, and Greece. She was also interested in swimming, golf, and birds. She has been described by a relative and a family friend as "a magnet," "personable," "fun, funny, can do," "vivid," and "warm." Langlands wrote of her, "Given her age at the time she finished her thesis, her

subsequent development suggests a spirit and cast of mind that were intellectually open and adventurous." At her death in 1967 at the age of eighty-six in Coral Gables, Mayme Logsdon was survived by her sister, Mary E. Irwin, of Chicago.

Organizational affiliations: AMS, MAA (charter member), AAAS, Sigma Delta Epsilon, AAUW, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1914 Synchronous curves. MA thesis, University of Chicago, directed by Kurt Laves. Typescript.

1921 Equivalence and reduction of pairs of Hermitian forms. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, 1922, distributed by the University of Chicago Libraries, reprinted from *Amer. J. Math.* 44:247–60.

Publications:

1922 Equivalence and reduction of pairs of Hermitian forms. *Amer. J. Math.* 44:247–60. Published version of PhD dissertation. Reviews: *JFM* 48.0095.02 (A. Loewy); *Rev. semestr. publ. math.* 31, pt. 1: 2 (E. B. Cowley). Presented as "The equivalence of pairs of Hermitian forms" to the AMS, Chicago, 25 Mar 1921; abstract: *Bull. Amer. Math. Soc.* 27:403–04 #4; review of abstract: *JFM* 48.0095.01 (A. Loewy).

1925 Complete groups of points on a plane cubic curve of genus one. *Trans. Amer. Math. Soc.* 27:474–90. Reviews: *JFM* 51.0513.06 (W. Fr. Meyer); *Rev. semestr. publ. math.* 33, pt. 2: 16 (P. Mulder). Presented as "Closed sets of rational points on a plane cubic curve of genus one" to the AMS, Evanston, IL, 29 Dec 1922; abstract: *Bull. Amer. Math. Soc.* 29:119 #5.

1929 König and Kraft's Elliptic Functions. Review of *Elliptische Funktionen*, by R. König and M. Kraft. *Bull. Amer. Math. Soc.* 35:877–79.

1932 Review of *Elementargeometrie der Ebene und des Raumes*, by M. Zacharias. *Amer. Math. Monthly* 39:112.

1932–33 *Elementary Mathematical Analysis.* 2 vols. New York: McGraw-Hill Book Co. Reviews: *Amer. Math. Monthly* 40:486–87 (C. A. Nelson); *Math. Teacher* 32:491 (vol. 1) and 33:314–15 (vol. 2); *Sch. Sci. Math.* 33:339–40 (J. M. Kinney).

1933 Review of *Analytische Geometrie*, 2nd ed., by L. Bierberbach. *Bull. Amer. Math. Soc.* 39:187.

1934a Review of *Lehrbuch der höheren Mathematik für Universitäten und technische Hochschulen*, vols. 1 & 2, by G. Kowalewski. *Bull. Amer. Math. Soc.* 40:23–24.

1934b Review of *Lehrbuch der höheren Mathematik für Universitäten und technische Hochschulen*, vol. 3, by G. Kowalewski. *Bull. Amer. Math. Soc.* 40:517.

1935 *A Mathematician Explains.* Chicago: Univ. of Chicago Press. Chapter 8 by G. A. Bliss, reprinted with minor changes from *Amer. Math. Monthly* 40 (1933). Reviews: *Amer. Math. Monthly* 44:528–30 (L. R. Ford); *Math. Gaz.* 20:231–32 (T. A. A. Broadbent); *Math. Teacher* 29:50; *Natl. Math. Mag.* 10:236 (D. McCoy); *Sch. Sci. Math.* 36:103–04 (J. M. Kinney); *Sci. American* 154:357 (A. G. Ingalls). Second ed.: 1936. Chicago: Univ. of Chicago Press. Reviews of 2nd ed.: *Book Rev. Digest* 32:603; *JFM* 61.0959.02 (G. Feigl); "A book about mathematics," *Sch. Rev.* 44:712–13 (A. E. Mallory). Reprints: 1961. Phoenix Science Series. 1975. Midway Reprints.

1937 Review of *Das Grenzgebiet der elementaren und höheren Mathematik*, by K. Kommerell. *Amer. Math. Monthly* 44:474.

1938 Geometries. *Amer. Math. Monthly* 45:573–83. Review: *JFM* 64.0587.01 (E. Sperner). Presented to the NCTM, Atlantic City, NJ, 26 Feb 1938.

Abstracts not listed above:

1925 Cross ratios in the complex plane. *Amer. Math. Monthly* 32:331–32 #7. Presented to a meeting of the MAA, Peoria, IL, 8–9 May 1925.

1927a Algebraic geometry and the Italians. *Amer. Math. Monthly* 34:396 #9. Presented to a meeting of the MAA, Bloomington, IL, 13–14 May 1927.
1927b Conditions for mathematical study in Italy. *Amer. Math. Monthly* 34:449 #1. Presented to a meeting of the MAA, Madison, WI, 5–6 Sept 1927.
1927c Curves in r-space invariant under a net of homographies containing the identity. *Bull. Amer. Math. Soc.* 33:387 #6. Presented to the AMS, Chicago, 15 Apr 1927.
1927d A hypersurface in S_4 invariant under the general projective group of points on a line. *Bull. Amer. Math. Soc.* 33:387 #5. Presented to the AMS, Chicago, 15 Apr 1927.
1931 Reorganization of material for freshman mathematics. *Amer. Math. Monthly* 38:427 #1. Presented to a meeting of the MAA, Peoria, IL, 1–2 May 1931.
1936 The mathematics which is included in the physical science general course at the University of Chicago under the new plan. *Amer. Math. Monthly* 43:149 #9. Presented to a meeting of the MAA, Decatur, IL, 3–4 May 1935.
1937 The logical structure of four-dimensional space. *Amer. Math. Monthly* 44:348 #1. Presented to the MAA and the Indiana Philosophical Association, Greencastle, IN, 30 Apr 1937.

Presentations not listed above:
Reorganization of material for freshman mathematics. Principal speaker at meeting of the MAA, Lexington, KY, 9 May 1931.
The master's thesis. Presented to the MAA, Los Angeles, 29 Aug 1932.
Non-technical functions of mathematics. Presented to meeting of the Central Association of Science and Mathematics Teachers, 1935.
Off the beaten Path. Presented to the NCTM, Chicago, 20 Feb 1937.

References to: AmMSc 4–8, 9P–11P; AmWom 1935–40; BiDWSci; BioWMath.
"Former U. of C. Math Teacher Dies at Age 86." *Chicago Tribune*, 6 Jul 1967.

Other sources: MA thesis vita 1914; Owens questionnaires 1937, 1940; Owens Papers; Center for Research Libraries College Catalog Collection; Northwestern University Archives; University of Chicago Archives; e-mail communication with Robert P. Langlands 1999; telephone conversations with relative Nan Netherton and with family friend Dagney Johnson 1999; communication with historian Richard J. Meister (for Odgen Dunes information) 2007; communication with University of Chicago Archives and with University of Chicago Office of the Registrar; Anna A. Stafford, "Adapting the curriculum to our era," *School, Sci. and Math.* 37:400-415; Green and LaDuke, "Contributors to American Mathematics"; US Census 1870, 1880, 1900, 1910, 1920, 1930 KY, 1920 IL.

Last modified: September 23, 2015.

MADDISON, Isabel. April 13, 1869–October 22, 1950.
University of London (BSc 1893), Bryn Mawr College (PhD 1896), Trinity College (Dublin) (BA 1905).

Ada Isabel Maddison was born in Whitehaven, a seaport town in Cumberland, the most northwestern county in England. She was the daughter of Mary Jane (Anderson), born in about 1829 in Ireland, and John Maddison, born in about 1826 in Durham, England. Her father was a civil servant. British census records indicate that Isabel Maddison was probably the youngest of four children. The others were Anne (b. 1853), Jane (b. 1854), and William Thomas (b. ca. 1859). In 1871 the family was living in Whitehaven, where it appears that John Maddison was a parish supervisor, and in 1881 they were in Cardiff, Wales, where her father was an internal revenue collector. In 1891 Isabel Maddison and her sister Annie were in Bristol, England, with their brother, William T., a registered medical practitioner.

After attending Miss Tallies School in Cardiff, in June 1885 Isabel Maddison passed the matriculation examination at the University of London (an examining body only and not a teaching institution at that time). She then entered the University College of South Wales and Monmouthshire in Cardiff and passed the University of London intermediate science examination in 1887. She remained until 1889 but did not earn a degree from University College, Cardiff, since it did not grant degrees at that time. While Maddison was studying at University College in Cardiff she contributed solutions to the London *Educational Times*, eleven of which were published in *Mathematical Questions with their Solutions, from the "Educational Times"* between 1887 and 1889.

In 1889 Maddison went to Girton College in Cambridge on a scholarship given by the Clothworkers' Guild. With another first-year student, Grace Chisholm, she obtained permission to sit in on Arthur Cayley's lectures at Cambridge. In the beginning, her tutor at Girton was William Henry Young, who would marry Grace Chisholm in 1896. Chisholm later wrote that for Maddison "a high place in Tripos was worth 'bread and butter and dresses and hats' " (Grattan-Guinness 1972, 118). Thus, Chisholm, who believed her own tutor, Arthur Berry, superior to Young, convinced Maddison to share her tutorial the following year. Maddison and Chisholm took all their examinations at the same time; Maddison scored slightly better than Chisholm the first two years. At the end of the third year when they sat for Part I of the Tripos in spring 1892, their placement was reversed; both earned first class with Maddison equal to the twenty-seventh Wrangler. They both then unofficially sat for the Oxford Final Honours School in mathematics, the first women to do so. Chisholm remained another year at Girton and then went to Göttingen to become, with Mary Winston (Newson), one of the first three women to formally attend lectures and participate in the seminars there.

In 1892 Isabel Maddison came to Bryn Mawr College as a graduate student where she studied mathematics and practical physics. During that year she did work in singular solutions of differential equations and in 1893 published a paper in the British *Quarterly Journal of Pure and Applied Mathematics* on families of curves. Also in 1893, the University of London conferred a BSc with honours on her. According to the college archivist of Imperial College, London, she was "joint second highest in maths for that year [and] tuition was from University College Cardiff,

Girton (Cambridge), and Bryn Mawr. . . ." During 1893–94, her second year at Bryn Mawr, she was a fellow in mathematics, and in April 1894 was awarded Bryn Mawr's first Mary E. Garrett European fellowship. Charlotte A. Scott, in writing to Felix Klein asking that Maddison be admitted to the university at Göttingen, referred to her as "one of my best students." She also remarked, "When she first came to Bryn Mawr, she was, in my opinion, suffering from the effects of overtraining during her seven years of undergraduate life . . . . But her mind soon recovered its elasticity, and my opinion of her ability has increased steadily" (Universitätsarchiv Göttingen).

Maddison spent the year 1894–95 in Göttingen studying with Klein and David Hilbert, among others. The following year she was assistant secretary to M. Carey Thomas, the president of Bryn Mawr. At the end of that year she was awarded her PhD with a dissertation written under the direction of Scott in the area she first studied at Bryn Mawr, singular solutions of differential equations. For her doctorate she was examined in the fields of pure and applied mathematics and in physics. During the year 1895–96 Maddison prepared a translation of an 1895 address by Felix Klein to the Royal Academy of Sciences of Göttingen, which appeared in the *Bulletin* of the AMS.

From 1896 to 1904 Maddison served as secretary to President Thomas and as reader in mathematics. In 1904 her administrative position changed to assistant to the president, while in 1906 her departmental position changed to associate in mathematics. She remained in her dual departmental, administrative positions until 1910 at which time she became recording dean and assistant to the president, remaining in these positions until she retired in 1926. For at least a short period of time, Maddison lived with Charlotte Scott and Scott's cousin.

Although Maddison remained at Bryn Mawr her entire career, the only time she was an active participant in the Bryn Mawr Mathematics Journal Club that started in 1896 was during its first year when she spoke on "Curves which cover an area of the plane." During her years as secretary to the president, Maddison compiled information for handbooks of universities open to women and for a statistical study of women college graduates. She also is listed as author on several Bryn Mawr alumnae registers. Soon after receiving her doctorate she published a number of book reviews in the *Bulletin* of the AMS as well as a short note on the history of map-coloring problems.

According to the Bryn Mawr alumnae office, "in 1905 [Maddison] obtained leave to study at Trinity College, Dublin, where she received a B.A. degree" (Williams Papers). The University of Dublin, as it was also called, does not have a record of her studying there. According to the university's information office, Maddison "had the B.A. degree conferred on her by this University in 1905. She did not, however, study at the University but had completed the necessary exercises at the University of Cambridge to entitle her to have this degree conferred" (Williams Papers).

Isabel Maddison lived in Bryn Mawr most of the time she was associated with the college. She made a trip to England nearly every summer. During World War I, she contributed to the war effort. One summer she did secretarial work for the Woman's Committee of National Defense; another summer she did statistical work for the American Shipping Board. She and her older sister Janie sailed from England to New York in September 1925, before her retirement in 1926. At that time, she indicated that she lived in Wayne, Pennsylvania, near Bryn Mawr. In the October 1928 AMS membership list, she used an address of The Croft, Martin's Dam,

Wayne, which apparently was where she lived the rest of her life. She and her sister also made a trip from England to New York in April 1929, and her sister was listed as living with her in the 1930 census.

Although Maddison spent her last years in Pennsylvania, she maintained her identification with the country of her birth as a member of the London Mathematical Society and of the Daughters of the British Empire. She died in her home in Wayne at age eighty-one in 1950. "In her will she bequeathed $10,000 to Bryn Mawr in memory of M. Carey Thomas for use as a pension fund for nonfaculty staff members" (Tattersall and McMurran 1999, 301–2).

Organizational affiliations: AMS, London Math. Soc.

Dissertation:

1896a On singular solutions of differential equations of the first order in two variables and the geometrical properties of certain invariants and covariants of their complete primitives. PhD dissertation, Bryn Mawr College, directed by Charlotte Angas Scott. Printed, 1896, Longmans, Green & Co., London, reprinted from Quart. J. Pure Appl. Math. 28:311–74.

Publications:

1893 Certain factors of the c- and p-discriminants and their relation to fixed points on the family of curves. *Quart. J. Pure Appl. Math.* 26:307–21. Reviews: *JFM* 25.1087.01 (F. Meyer); *Rev. semestr. publ. math.* 3, pt. 1: 96 (W. Mantel).

1896a (Translator from the German) The arithmetizing of mathematics, by Felix Klein. *Bull. Amer. Math. Soc.* 2:241–49.

1896b *Handbook of Courses Open to Women in British, Continental, and Canadian Universities.* New York: Macmillan. Supplement: New York: Macmillan, 1897. Second ed.: *Handbook of British, Continental, and Canadian Universities, With Special Mention of the Courses Open to Women.* Compiled for the Graduate Club of Bryn Mawr College. NY: Macmillan, 1899. Review of 2nd ed.: *School Rev.* 7:508. Supplement to 2nd ed.: Bryn Mawr College, 1901. Second ed. also available on-line at Early Canadiana Online.

1896c On singular solutions of differential equations of the first order in two variables and the geometrical properties of certain invariants and covariants of their complete primitives. *Quart. J. Pure Appl. Math.* 28:311–74. Published version of PhD dissertation. Reviews: *Bull. des sci. math.* 2nd ser., 22:114–16 (J. Tannery); *JFM* 27.0240.03 (M. Hamburger); *Rev. semestr. publ. math.* 5, pt. 2: 97 (W. Mantel).

1897a Note on the history of the map-coloring problems. *Bull. Amer. Math. Soc.* 3:257. Reviews: *JFM* 28.0043.03 (E. Lampe); *Rev. semestr. publ. math.* 6, pt. 1: 4 (D. J. Korteweg).

1897b Two books on elementary geometry. Review of *Elements of Geometry*, by A. W. Phillips and I. Fisher, and *Elementary Solid Geometry and Mensuration*, by H. D. Thompson. *Bull. Amer. Math. Soc.* 3:253–55.

1898 Review of *Analytic Geometry for Technical Schools and Colleges*, by P. A. Lambert. *Bull. Amer. Math. Soc.* 4:234–35.

1899 Review of *Jacob Steiner's Vorlesungen über synthetische Geometrie. Zweiter Teil: Die Theorie de Kegelschnitte Gestützt auf projective Eigenschaften*, edited by J. Schröter and R. Sturm. *Bull. Amer. Math. Soc.* 6:113–15.

1917 *A Preliminary Statistical Study of Certain Women College Graduates: Dealing with the Health, Marriage, Children, Occupations of Women Graduating between 1869 and 1898 and Their Sisters and Brothers.* Compiled from information collected for the Association of Collegiate Alumnae in 1900. Bryn Mawr: Association of Collegiate Alumnae.

1932 Charlotte Angas Scott: An appreciation. *Bryn Mawr Alumnae Bull.* 12 (Jan): 9–12.

References to: AmMSc 1–8, AmNatBi, AmWomSc, BiDWSci, BioWMath, ConAu 169, MacTutor, NotMat, NotSci 2, NotTwCS 1S, NotWoSc, Poggendorff 4, WhoEast 1930, WomScSearch, WomWWA.

"Ex-Dean I. Maddison, Long at Bryn Mawr." (Obituary) *New York Times*, 24 Oct 1950.
Whitman, Betsey S. "Ada Isabel Maddison (1869–1950)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 144–46. Westport, CT: Greenwood Press, 1987.
Tattersall, James J. and Shawnee L. McMurran, "Maddison, Isabel." In *American National Biography*, 14:301–2. New York: Oxford University Press, 1999.

Other sources: PhD dissertation life; Owens questionnaire 1937; Williams Papers; Bryn Mawr College Archives; Universitätsarchiv Göttingen, Niedersächische Staats- und Universitätsbibliothek; communication with Imperial College, London, archivist; Ivor Grattan-Guinness, "A Mathematical Union: William Henry and Grace Chisholm Young," *Ann. Sci.* 29 (1972): 105–86; Grinstein, "Some 'Forgotten" Women of Mathematics"; Whitman, "Women in the American Mathematical Society before 1900," pt. 2; P. C. Kenschaft, "Charlotte Angas Scott, 1858–1931," *College Math. J.* 18 (1987): 98-110; communication with James J. Tattersall, compiler of mathematical problems database, 2014; England Census 1871, 1891; Wales Census 1881; US Census 1900, 1910, 1920, 1930 PA.

Last modified: September 23, 2015.

MANGOLD, Sister Marie Cecilia. December 5, 1872–February 9, 1934. Trinity College (Washington, D.C.) (BS 1910, MS 1914), Catholic University of America (PhD 1929).

Josephine Margaret Mangold was born in Cincinnati, Ohio, the daughter of Mary Anna (Hemann), born in Cincinnati in 1843, and Matthew Mangold, born in Bavaria, Germany, in about 1833. Eight of their children survived of ten born. They were Mary P. (b. ca. 1866), Anna (b. ca. 1868), Laura (b. ca. 1870), Philomena (b. ca. 1871), Josephine (b. 1872), Edward (b. ca. 1877), Matthew (b. 1881), and Anthony (b. 1882). Their father was a dealer in imported wines, brandies, and liquor; their mother was a housewife who was widowed by 1900.

Josephine Mangold attended parochial school and later the Academy of the Sisters of Notre Dame de Namur in Cincinnati. In March 1898 she entered the novitiate of the Sisters of Notre Dame de Namur in that city and professed in August 1900. At that time the Ohio Province of the Sisters of Notre Dame embraced all foundations east of the Rocky Mountains, so after Sister Marie Cecilia Mangold taught in the high school at Notre Dame Academy in Cincinnati, she was sent to Washington, D.C., in January 1901, to Trinity College, which now calls itself Trinity (Washington) University. There she was to assist in the teaching of German and to study mathematics with Sister Blandina of the original Trinity faculty.

Trinity College was established in 1897 and first offered instruction at the postsecondary level in 1900. Sister Marie Cecilia began to teach mathematics there in 1902. The bachelor's degree was first conferred at Trinity in 1904; that year Sister Marie Cecilia succeeded Sister Blandina and then directed the mathematics department until her death in 1934. While teaching at Trinity College, she also took courses there. Her entrance credits included a Trinity College exam, high school certificate, and normal courses she had taken previously. She completed the work for her BS degree in 1910 with major subjects mathematics and physics. She took no mathematics courses at Trinity, having been given credit for the elementary courses from the Notre Dame normal courses and having done all of her advanced work in both mathematics and physics privately, most likely under the guidance of faculty from the Catholic University of America. She continued her private study and earned an MS from Trinity in 1914 with a mathematics major and chemistry minor. Her master's degree was granted just prior to the opening of Catholic Sisters College, which formalized the practice of teaching women religious at Catholic University.

Since women religious were not listed in the register of students at Catholic University until 1928–29, public documents do not indicate when Sister Marie Cecilia began taking courses there. She studied mathematics under Aubrey E. Landry, history of science under Rev. Patrick W. Brown, and educational measurement under T. G. Foran at Catholic University. She wrote two papers in educational measurement, which appeared in 1927 and 1929. After writing a dissertation in algebraic geometry under the direction of Landry, Sister Marie Cecilia received her PhD in 1929 with a minor in education. She was the second woman religious in this country to earn a PhD in mathematics; the first was Sister Mary Gervase (Kelley) in 1917.

During her more than thirty years on the faculty at Trinity College, Sister Marie Cecilia was either the only member, or one of two members, of the mathematics department. In her earliest years in the department she taught trigonometry, solid

geometry, analytic geometry, advanced algebra, differential and integral calculus, theory of equations, theory of determinants, and history of mathematics. In 1907–08 she introduced analytical mechanics, and in 1910–11 advanced calculus and a teachers' course with a calculus prerequisite. In 1914–15 three courses for graduates, differential equations, vector analysis, and projective geometry, were added to the curriculum; in 1919–20 practical mathematics for students in physics and practical mathematics for students in chemistry were introduced; and in 1923–24 a course in statistical methods was added. The Pascal Circle, the Trinity College mathematics club, was organized in 1916 with Sister Marie Cecilia the faculty advisor and honorary president. In a memorial article after her death it was reported that "she was a lover of the classics, and a firm believer in the adage, 'The best mathematician is a student in every field'" ("In Memoriam").

Sister Marie Cecilia was in ill health for a number of years before her death at the college in 1934 at age sixty-one. Among the pallbearers at her funeral were Aubrey E. Landry and Otto J. Ramler of the mathematics department at Catholic University. She is buried at Mount Olivet Cemetery in Washington, D.C. The Sr. Marie Cecilia Memorial Prize was awarded at least once, in 1942, to a senior mathematics major.

Organizational affiliations: AMS, MAA (charter member).

Thesis and dissertation:
1914 Application of the complex variable to certain problems in metric geometry. MS thesis, Trinity College.
1929 The loci described by the vertices of singly infinite systems of triangles circumscribed about a fixed conic. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC.

Publications:
1927 *Methods of Measuring the Reliability of Tests*. Washington, DC: The Catholic Education Press. Educational Research Bulletins, vol. 2, no. 8.
1929 with Sister Mary Louise M'Graw. *Group Intelligence Tests in the Primary Grades*. Washington, DC: The Catholic Education Press. Educational Research Bulletins, vol. 4, no. 2.

References to: AmMSc 5.
"Sister Marie Cecilia." (Death notice) *Washington Post*, 11 Feb 1934.
"Funeral Services Held for Sister Marie Cecilia." *Trinity Times*, 1 Mar 1934.
"In Memoriam." *Trinity Times*, 1 Mar 1934.

Other sources: PhD dissertation vita 1929; Trinity College Archives; communication with Sisters of Notre Dame de Namur, Ohio Province Archives; Mullaly, *Trinity College, Washington, D.C.: The First Eighty Years 1897–1977*; US Census 1860, 1870, 1880, 1900, 1910 OH, 1920, 1930 DC.

Last modified: December 12, 2008.

MARIA, May (Hickey). December 16, 1904–June 8, 2001.
Rice Institute (BA 1926, MA 1927, PhD 1929).

Deborah May Hickey was born in Lumberton, Mississippi, the fifth of seven children of Edna May (Adams) (1873–1955) and Charles Robert Hickey (1874–1956), both of Alabama. In the early years of her parents' marriage, her father farmed in Alabama, where the first four children were born: Charles Middleton (1897–1991), Thomas Earl (1899–1984), Ernest Pleasanton (1900–1993), and Mary Ruth (1902–1990). The family lived in Mississippi when Deborah May and Maude Isabel (1907–1954) were born; by 1910 the family had moved to Dallas, Texas, where May Hickey's father was working as a laborer. The youngest daughter, Martha Louise (1911–1980), was born in Deport, Texas.

When May Hickey was in the seventh grade, the family moved to Houston so the children could attend Rice Institute (now Rice University), which provided tuition-free education to white residents of Houston until its charter was modified in 1963. While there, her father, who had not attended high school, worked for an oil refinery, an automobile assembly plant, and then the railroad. Her mother, who had attended high school and worked in dressmaking and millinery, took a course in stenography and became a secretary. May Hickey Maria recalled in 1992 that much of her education occurred at home; for example, her mother frequently read aloud to the children, Charles Dickens being among the selections. May, who had always liked mathematics, and her sisters went to public high school in Houston Heights. All seven children eventually attended Rice, earning altogether six bachelor's degrees, one master's degree, and one PhD from that university, and two master's degrees from other universities. Her brothers became engineers, two sisters were teachers, and one did clerical work in a bank.

May Hickey graduated as valedictorian from Houston Heights High School before entering Rice Institute in 1922. She was named a Hohenthal scholar after her first year and received the Graham Baker student award in 1924. She graduated from Rice in 1926 with honors in mathematics. She continued to study, as a fellow, the next three years in the graduate school there. Hickey earned her master's degree with honors in mathematics and physics in 1927, and a paper based on her thesis appeared in the *Annals of Mathematics* in 1929. When she was awarded her doctorate in 1929, she became the first woman to earn a PhD in any field at Rice. The published version of her dissertation appeared in the *American Journal of Mathematics* in 1932.

Hickey spent the year 1929–30 in Munich as a holder of the Alice Freeman Palmer fellowship of the AAUW, for which she received $1600. She went there specifically to study with Constantin Carathéodory whom she had first met at Rice and whose lectures she had heard at the University of California in Berkeley in the summer of 1928. While at Munich she took two courses with Carathéodory and participated in a seminar during the spring semester. She also traveled alone to Italy on a vacation while in Europe that year.

When May Hickey returned from Munich she took a position as professor of mathematics at Delta State Teachers College in Cleveland, Mississippi, replacing Julia Dale, who had been chairman of the department before leaving in 1930. Hickey remained as professor and chairman in the one- or two-person department at Delta

State until 1938. During that period two of her mathematics research papers appeared, and she prepared a chapter for a Mississippi Department of Education publication on improvement of instruction.

On June 2, 1938, Deborah May Hickey married Alfred Joseph Maria (December 4, 1896–June 14, 1964). Maria, a native of Norfolk, Virginia, graduated with a BS in chemical engineering from the Massachusetts Institute of Technology in 1922. He received a fellowship to Rice that fall and received a master's degree in 1923 and a PhD in 1925 in mathematics from Rice Institute. May Hickey was a student of his in both her freshman and junior years at Rice. Early in his career A. J. Maria taught at Rice, the University of Illinois, and Duke; he held an NSF fellowship abroad; he was a research fellow at Princeton; and he spent a year at the Institute for Advanced Study.

After their marriage May Hickey and Alfred J. Maria spent some time in Houston and then in Norfolk, Virginia, with his parents. In the summer of 1939, May Maria taught at the State Teachers College in Radford, Virginia. In 1939 they moved to New York City where both eventually became affiliated with Brooklyn College. Albert J. Maria first obtained a temporary appointment as tutor; he began in the day session in spring 1939 and had continuous employment at Brooklyn College after that. He was an instructor 1939–47, assistant professor from 1947 to about 1956, and then associate professor. Because of a brain tumor, he was on leave in the spring semester before his death in June 1964.

May Hickey Maria was an instructor in the evening session 1939–41 and in the summer session 1940–45 at Brooklyn College. She was a substitute in the day session 1941–42 when someone left for war-related work. She was an instructor at Queens College 1942–43. Her regular appointment at Brooklyn began after the war when she was an instructor 1946–55 and received tenure in 1948. She was an assistant professor 1955–62 and an associate professor 1962–75; she never applied for promotion to full professor. Both May Hickey and Albert J. Maria taught in summer school in the earlier years. He also taught in the division of graduate studies his entire time at Brooklyn as did she from the mid-1950s. Her 1958 book on an axiomatic development of arithmetic and algebra was used in a course designed to satisfy the school's mathematics requirement. In summer 1959 she taught in an NSF institute for high school teachers at Arizona State University. While living in New York she was a regular attendee of regional meetings of the AMS and the Metropolitan New York Section meetings of the MAA, the latter starting with its organizational meeting in 1941. When she was teaching at Delta State she had attended meetings of the Louisiana-Mississippi Section of the MAA and served as secretary 1932–33.

After her retirement in 1975 May Maria continued to live in her apartment a few blocks from Brooklyn College, where she had lived since 1941. She was a member of the Church of the Nativity, an Episcopal church in Brooklyn. In 1992 she was planning to move to Texas and did so the following year. She then lived at Westminster Manor, a retirement home in Austin.

May Maria died at Seton Medical Center in Austin in 2001. She was ninety-six. She was survived by a dozen nieces and nephews and was buried in Austin Memorial Park. The obituary notes that "throughout her life, she inspired others by her unshakable integrity and optimism, her independent spirit, and her lifelong passion for learning."

Organizational affiliations: AMS, MAA, AWM, AAAS, AAUW, Phi Beta Kappa, Sigma Xi.

Theses and dissertation:

1927 [Hickey, D. M.] Green's function at the point of equilibrium. MA thesis, Rice Institute, directed by Griffith Conrad Evans. Typescript.

1929a [Hickey, M.] The fifth degree equation. Minor thesis, Rice Institute. Typescript.

1929b [Hickey, M.] The Heisenberg theory. Minor thesis, Rice Institute. Typescript.

1929c [Hickey, D. M.] A three dimensional treatment of groups of linear transformations. PhD dissertation, Rice Institute, directed by Lester Randolph Ford. Typescript.

Publications:

1929 [Hickey, D. M.] The equilibrium point of Green's function for an annular region. *Ann. of Math.* 2nd ser., 30:373–83. Published version of MA thesis. Review: *JFM* 55.0887.04 (E. Rothe). Presented by title to the AMS, New York City, 29 Oct 1927; abstract: *Bull. Amer. Math. Soc.* 34:9 #26.

1932 [Hickey, D. M.] A three-dimensional treatment of groups of linear transformations. *Amer. J. Math.* 54:635–47. Published version of PhD dissertation. Reviews: *JFM* 58.0670.02 (R. Weitzenböck); *Zbl* 005.29605 (P. J. Myrberg). Presented by title as "Isometric circles on the sphere" to the AMS, New York City, 27 Dec 1928; abstract: *Bull. Amer. Math. Soc.* 35:173 #36.

1935 [Hickey, D. M.] A note on the equilibrium point of the Green's function for an annulus. *Bull. Amer. Math. Soc.* 41:389–93. Reviews: *JFM* 61.0534.03 (E. Rothe); *Zbl* 012.06902 (J. J. Gergen).

1939 [Hickey, M.] The efficiency of certain shapes in nature and technology. *Math. Teacher* 32:129–33.

1958 *The Structure of Arithmetic and Algebra*. New York: John Wiley and Sons. Reviews: *Amer. Math. Monthly* 67:92–93 (D. A. Norton); *Zbl* 098.24502 (H. Rohrbach).

Abstract not listed above:

1935b [Hickey, M.] Groups of space transformations resulting from inversions in spheres. *Amer. Math. Monthly* 42:410 #1. Presented to the MAA and the NCTM, Pineville, LA, 29 Mar 1935.

References to: AmMSc 5–6.

Rhoades, Tracey. "Teaching Tenacity." *Sallyport: The Magazine of Rice University*, Winter 1997.

"Deborah May Maria." (Obituary) *Austin* (*TX*) *American-Statesman*, 11 Jun 2001.

"Maria, May H." (Death notice) *New York Times*, 12 Jun 2001.

Other sources: Smithsonian questionnaire 1982; author's conversation with May H. Maria 1992; communications with Austin (TX) Public Library and with Cook-Walden Funeral Home (Austin, TX); "Prof. Alfred J. Maria, 67, Mathematician at Brooklyn," (Obituary) *New York Times*, 17 Jun 1964; US Census 1900 AL, 1910, 1920, 1930 TX; SSDI.

Last modified: August 1, 2009.

MARTIN, Emilie Norton. December 30, 1869–February 8, 1936.
Bryn Mawr College (BA 1894, PhD 1901).

Emilie Norton Martin was born in Elizabeth, New Jersey, the eldest of three surviving children of Mary Holmes (Ford) (b. 1838) and Robert Wilkie Martin (b. 1841) of Pennsylvania. Her parents married in 1868, and her siblings were a sister, Mary Ford (b. 1871), and a brother, Collier Ford (1873–1941). Her father was a surgeon, and her brother became a physician and professor of medicine in Philadelphia.

Martin was prepared for college at Mrs. E. L. Head's School in Germantown, Philadelphia, and by private study. She entered Bryn Mawr College in 1890 and remained a student affiliated with the college for most of the decade. Her major areas of study as an undergraduate were Latin and mathematics. Immediately after she earned her bachelor's degree in 1894, she began graduate studies there.

Martin was a graduate student in mathematics and physics during the first semester 1894–95 and was a teacher of Latin in the Bryn Mawr School in Baltimore during the second semester of that year. She resumed her studies as a fellow in mathematics 1895–96 and continued as a graduate student 1896–97. The Mathematics Journal Club at Bryn Mawr began in the fall of 1896, and records show that Martin, who spoke on a topic in group theory, was one of four graduate students who gave presentations that year. The other speakers were Charlotte A. Scott and James Harkness, the Bryn Mawr mathematics faculty members; Frank Morley and E. W. Brown, mathematics faculty from nearby Haverford College; and Isabel Maddison, an 1896 Bryn Mawr PhD recipient who was a reader in mathematics.

Charlotte Scott, in a letter of March 19, 1897, to Felix Klein, wrote, "I am expecting to send two of my best students to Göttingen next year; to both of them have been awarded College Fellowships, ... One of them you met when you were here that Sunday afternoon" (Klein Nachlass, XI, Briefe an Klein, Universitätsarchiv Göttingen). One was Emilie Martin, as a holder of the Mary E. Garrett European fellowship; other Bryn Mawr students in Göttingen during the year 1897–98 were Virginia Ragsdale and Fanny Gates. All were in Klein's course in Mechanik during the winter semester, and Martin and Ragsdale were in the course in the summer semester of 1897–98. Ragsdale also studied with David Hilbert at Göttingen.

Martin returned to Bryn Mawr as a fellow by courtesy in mathematics for the year 1898–99. According to the description of her life given in her dissertation, she studied mathematics with Charlotte Scott and James Harkness, passed her doctoral examination in the spring of 1899, with a "double minor" in physics, which she studied under Arthur Stanley Mackenzie. Although her name and dissertation title appear in the 1899 commencement program and on the 1899 list in *Science* of doctorates conferred, her PhD was dated 1901, the year her dissertation was published. The published version, which bears a slightly different title than the title that appeared in 1899, was mentioned in G. A. Miller's second and third reports on progress in finite group theory published in the *Bulletin* of the AMS in 1902 and 1907, respectively. Her dissertation was written under the direction of James Harkness; nonetheless, Harkness does not seem to have been the faculty member by whom she felt most influenced. Martin later endowed a mathematical book fund at Bryn Mawr "in appreciation of ... inspiration given during her study under

the guidance of Professor Charlotte Angas Scott" (Bryn Mawr College Library, Mathematical Book Fund).

Emilie Martin's first position after leaving Bryn Mawr in 1899 was as a teacher of mathematics in the Misses Kirk's School, Rosemont, Pennsylvania, during 1899–1900. She was also a collaborator for the *Revue semestrielle des publications mathématiques* during the years 1899–1902. Martin did postgraduate work at Bryn Mawr in 1901–02, when her name again appears on the list of those giving talks in the journal club. She was also a private tutor of mathematics and Latin 1893–1903.

Martin took a position as instructor at Mount Holyoke College in 1903. She was an instructor there 1903–04 and first semester 1904–05. She had a leave of absence for the second semester of 1904–05. During this period she compiled the general index for the years 1891–1904 of the *Bulletin* of the AMS. Martin returned to Bryn Mawr for postdoctoral study in 1906–07 and again participated in the journal club. Her presentations were on methods of representing functions of a complex variable and on Klein's new kind of Riemann surface.

In 1907 Martin returned to Mount Holyoke College as instructor. She remained at that rank until 1911, when she was promoted to associate professor. She was promoted to professor in 1925 and became professor emeritus after her resignation in September 1935. She was also department chairman from 1927 through 1935.

Martin described herself as a Presbyterian in 1914 and later was said to have maintained an interest in religious issues. Also in 1914, she listed herself as a member of the American Geographical Society and the College Club of Philadelphia. In addition to her work as a mathematics professor, she was a resident faculty member of Pearsons Hall, where she lived during the greater part of her career at Mount Holyoke. She also was secretary of the Mount Holyoke branch of the AAUP. She traveled in Europe in the summer of 1926. For many years she spent summers with her sister in Montreat, North Carolina.

In 1934 Emilie Martin was diagnosed with cancer and underwent surgery in June of that year. She resigned her position in September 1935 and died in February 1936 at age sixty-six in her apartment in Hooker House on the Mount Holyoke campus. One of Martin's closest friends, Frances Haynes, assistant librarian at Mount Holyoke, accompanied her body to Philadelphia, where she was buried.

Organizational affiliations: AMS, MAA (charter member), AAAS, AAUP.

Dissertation:

1899 Determination of the non-primitive substitution groups of degree fifteen and of the primitive substitution groups of degree eighteen. PhD dissertation, Bryn Mawr College, directed by James Harkness. Printed version, 1901, Baltimore, MD, reprinted from *Amer. J. Math.* 23:259–86. PhD granted 1901.

Publications:

1901 On the imprimitive substitution groups of degree fifteen and the primitive substitution groups of degree eighteen. *Amer. J. Math.* 23:259–86. Published version of PhD dissertation. Reviews: *JFM* 32.0157.01 (A. Loewy); *Rev. semestr. publ. math.* 10, pt. 1: 2–3 (P. H. Schoute). Presented as "Note on the imprimitive substitution groups of degree fifteen, and on the primitive substitution groups of degree eighteen" by G. A. Miller to the AMS, Columbus, OH, 25 Aug 1899; abstract: *Bull. Amer. Math. Soc.* 6:10.

1904 (Compiler) *Bulletin of the American Mathematical Society. General Index. 1891–1904.* Macmillan Company.

1917 Relating to required mathematics for women students. *Amer. Math. Monthly* 24:394–98. Reprint: 1978. *AWM Newsletter* 8 (2): 10–12.

1923 Some varieties of space. *Math. Teacher* 16:470–80.
1933 Review of *Arithmetic for Teachers*, by H. E. Glazier. *Mount Holyoke Alumnae Quarterly* 17 (May): 26.

References to: AmMSc 1–5, AmWomSc, BiDWSci, BioWMath, MacTutor, WomSc-Search, WomWWA.
"Dr. Emilie Norton Martin, Former Mt. Holyoke College Professor, Dies." *Holyoke Transcript*, 8 Feb 1936.
"Miss Emilie N. Martin." (Obituary) *New York Times*, 9 Feb 1936.
"Funeral Services for Prof. Martin." *Holyoke Transcript*, 10 Feb 1936.

Other sources: PhD dissertation life; Williams Papers; Bryn Mawr College Archives; Universitätsarchiv Göttingen, Niedersächische Staats- und Universitätsbibliothek; Mount Holyoke College Archives; communications with Bryn Mawr College Archives and with Mount Holyoke College Archives; Bryn Mawr College Library, Mathematical Book Fund; G. A. Miller, "Second report on recent progress in the theory of groups of finite order," *Bull. Amer. Math. Soc.* 9 (1902): 106-123; G. A. Miller, "Third report on recent progress in the theory of groups of finite order," *Bull. Amer. Math. Soc.* 14 (1907): 124-133; Whitman, "Women in the American Mathematical Society before 1900." Pt. 3; US Census 1870 NY, 1880 FL, 1900 PA, 1930 MA; Massachusetts death certificate.

Last modified: January 13, 2016.

MAUCH, Margaret E. June 1, 1897–November 16, 1987.
Huron College (BS 1919), University of Chicago (MS 1923, PhD 1938).

Margaret Evelyn Mauch was born in De Smet, South Dakota, the first child of Rose (Brekhus) (b. 1868) and Henry Mauch (b. 1861). Her mother was born in Norway and her father in Wisconsin of German parents. Mauch grew up in the east central area of South Dakota near De Smet. At the time of the 1900 census the family was living in Lake Preston, her parents had been married four years, and her father's occupation was listed as harness maker. A younger sister, Ruby Henrietta, was born in 1899. By 1910 Henry Mauch, now a banker, had been remarried for three years, and the family was living in Hetland. In much of the second decade of the century, Henry Mauch was secretary-treasurer of the Arlington-Hetland Telephone Company. By 1930 he was bank president. There were two sons from the second marriage: Ralph, born in 1909, and Harold, born two years later.

Margaret Mauch attended elementary and secondary public schools in South Dakota. She studied at Huron College (now closed) in Huron, about thirty miles from De Smet. After receiving her bachelor's degree in 1919, she taught for a year at the Winner, South Dakota, high school in the south central part of the state and then was principal of the Edgerton high school in Minnesota for a year. The next two years, 1921–23, Mauch attended the University of Chicago where she was secretary-treasurer of the Junior Mathematical Club 1922–23. She received her master's degree with a thesis in theoretical mechanics in 1923.

Mauch taught in the high school in Jacksonville, Florida, 1924–25 and was an instructor and assistant professor at Randolph-Macon Woman's College in Lynchburg, Virginia, 1925–29. She returned to the University of Chicago to take graduate courses during the summers of 1926, 1928, and 1929. Following the summer of 1929 she remained at Chicago for the academic year 1929–30. She again took summer classes at Chicago during 1931 and 1938 and received her PhD in 1938 having written a dissertation in number theory under the direction of L. E. Dickson. Although Mauch's degree was not conferred until 1938, she had obtained some of her results on Waring's theorem for seventh powers considerably earlier. In Dickson's 1933 article, "Recent Progress on Waring's Theorem and its Generalizations," he mentions her work on page 721 at the end of the section he calls "Remarkable Empirical Generalizations of Waring's Theorem."

Mauch was head of the mathematics department at the high school in Brookings, South Dakota, 1934–42 and then was an instructor and assistant professor at Carleton College in Northfield, Minnesota, 1942–44. She spent 1944–45 as an instructor at Michigan State College (now Michigan State University). In 1945 Mauch became assistant professor at the University of Akron, where she was to stay the remainder of her career. When she first went to Akron she regularly attended meetings of the Ohio Section of the MAA and was a referee for the *American Mathematical Monthly*. She was promoted to associate professor in 1950 and to professor in 1962. She retired in June 1963 but continued teaching at the University of Akron and was given the rank emeritus professor in 1966.

In 1966 Margaret Mauch and her sister, Ruby Mauch, moved back to Huron, where they both had attended college and where their younger brother, Ralph, a graduate of the University of South Dakota Law School, was an attorney and officer of the Northwestern Public Service Company. Ruby Mauch had also taught in high

schools in South Dakota after her college graduation, later earned a library degree from the University of Illinois, and, among other library positions, served for twenty-seven years in the library at the South Dakota School of Mines and Technology; she retired in 1964. Ralph Mauch died at seventy-five in 1985. Margaret Mauch died at the Violet Tschetter Memorial Home in Huron at age ninety in 1987. She was buried in the Hetland, South Dakota, cemetery. Her sister, Ruby, died at the same nursing home five years later.

Organizational affiliations: AMS, MAA, AWM, Sigma Delta Epsilon, AAUW, AAUP, Sigma Xi.

Thesis and dissertation:
1923 The motion of a certain rotating bar. MS thesis, University of Chicago, directed by William Duncan MacMillan. Typescript.
1938 Extensions of Waring's theorem on seventh powers. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Typescript. Printed version, 1941, Chicago.

References to: AmMSc 7–8, 9P–11P; WhoAmW 8.
"Margaret E. Mauch." (Obituary) *Huron* (SD) *Daily Plainsman*, 17 Nov 1987.

Other sources: MS thesis vita 1923; PhD dissertation vita 1938; Owens questionnaire 1940; communication with Huron (SD) Public Library; L. E. Dickson, "Recent Progress on Waring's Theorem," *Bull. Amer. Math. Soc.* 39: 701–27; "Ralph E. Mauch." (Obituary) *Huron Daily Plainsman*, 9 Jun 1985; "Ruby H. Mauch." (Obituary) *Huron Daily Plainsman*, 22 Jan 1992; US Census 1900, 1910, 1920, 1930 SD, 1930 IL.

Last modified: March 8, 2009.

MAYER, Joanna Isabel. March 6, 1904–February 28, 1991.
Dominican College of San Rafael (BA 1927), Marquette University (MA 1928, PhD 1931).

Joanna Isabel Mayer was born in Pettis County, near Sedalia, Missouri, the third of five children of Anna (Poinsignon) (1871–1960) and Edward John Mayer (ca. 1869–1941), both born in Missouri. Her parents, of farm families, continued to farm after their marriage in Sedalia in about 1897. Her siblings were Emil Joseph (1898–1967), Mary Helen (Ella) (1902–1981), Francis Nicholas (1906–1995), and Elizabeth (1909–1989). Census records indicate that in 1910 the family was living in Dresden Township, near Sedalia, Missouri, and Edward Mayer was a farmer; in 1920 the family was living in Portland, Oregon, where he was a farmer and a laborer; in 1930 they were living in Salina, Kansas. No occupation was indicated for her father, but Joanna Mayer was listed as a parochial school teacher.

Letters written in 1984 and 1985, when Joanna Mayer was about eighty years old, describe her family's many moves and the schools she attended before she entered college. There is also sketchy material about places she lived and jobs she held. It has been impossible to confirm all of the details.

It appears that the only schools she attended were Catholic schools, and later she only taught in such schools. She first attended the Sacred Heart school in Sedalia, Missouri. In about 1917 the family moved to Hollywood, California, where she and Ella attended Cathedral High School. After the "great flu" they moved to Phoenix, Arizona, where her father and brother sold cars. They moved back to Los Angeles, from there to San Jose, and then to Portland, Oregon, for a year. It has been confirmed that she was in the first academic class at St. Mary's Academy in Portland during the school year 1919–20, when she was fifteen years old. Joanna Mayer reported that the family then moved to Seattle, then briefly to Spokane, and then to Kansas City, Missouri, where she went to Loretto High School, a Catholic girls' school. They moved to Florida and ended up in Nashville, Tennessee, where she went to St. Bernard's High School. From there they moved to Kansas City and then to Salt Lake City, and back to San Jose, in the San Francisco Bay area, where, with some interruptions, she and some members of her family were to spend much of the remainder of their lives.

According to records at Dominican College in San Rafael, California, Joanna Mayer graduated from Notre Dame High School in San Jose before entering Dominican College for her undergraduate work. Apparently the family first lived in Oakland and then in San Rafael while she attended college. Mayer indicated that she started to study mathematics while in Oakland and started to major in mathematics her second year in college. In May 1927 Mayer received her BA degree from Dominican College with a major in mathematics and a minor in philosophy. While there she was influenced by Anna Marie Whelan, who taught at Dominican 1925–27 before moving to a position at Hunter College.

Mayer's older sister, Mary Helen Mayer, also attended Dominican College in San Rafael and earned a bachelor's degree in 1926. She earned a master's degree from Marquette University in Milwaukee, Wisconsin, in 1928 with a thesis, "The Educational Theories of St. Thomas Aquinas." It appears from correspondence with Joanna Mayer that her sister Mary Helen taught at Dominican College for a while.

Her youngest sister received a bachelor's degree from Clarke College, a Catholic college in Dubuque, Iowa, in 1932.

Mayer entered Marquette University graduate school in 1927 and remained enrolled until 1931; she received the MA degree in June 1928. In the preface to her master's thesis she wrote, "The choice from the field of Invariants of a topic for a thesis grew out of an interest in the subject which my major Professor at Dominican College, San Rafael, California, inspired in the last course I had the privilege of taking from her. To Dr. Anne Marie Whelan, then, I owe my first acknowledgment of gratitude." Mayer's election to membership in the MAA was announced in the June 1930 issue of the *Monthly*, and her position, presumably for the 1929–30 academic year, was described as head of the department at Marymount College in Salina, Kansas, where she and her parents were living. In June 1931 she received her PhD, the first awarded by Marquette in mathematics. Her dissertation was directed by H. P. Pettit, who had also directed her master's thesis.

Mayer's dissertation begins:

> Ruth Gentry introduces her dissertation On the Forms of Plane Quartic Curves as follows:
>
> > "Many papers dealing with curves of the fourth order, or Quartic Curves, are to be found in the various mathematical periodicals; but these leave the actual appearance of the curve as a whole so largely to the reader's imagination that it is here proposed to give a complete enumeration of the fundamental forms of Plane Quartic Curves as they appear when projected so as to cut the line infinity the least possible number of times . . . , together with evidence that the forms presented can exist."
>
> It is the purpose of my dissertation to show whether it is possible to derive, and how to construct, all of the forms proposed in Gentry's dissertation by the method used by Doctor H. P. Pettit in his "Projective Description of Some Higher Plane Curves."

Mayer's dissertation ends with a description of those curves enumerated by Gentry that she succeeded in generating.

Joanna Mayer's name appears on the November 1931 MAA membership list with an address in Sedalia, Missouri. By some time in 1932 she is apparently a teacher in San Jose, California. In 1937–38, Joanna Mayer was an instructor at Seton Hill College (now Seton Hill University), a Catholic school in Greensburg, Pennsylvania, and at that time a women's college. Articles in the Seton Hill alumnae magazine and the student newspaper indicate that she was there to replace a faculty member on leave for the year for graduate study. They report that she had come from San Francisco College for Women, a Catholic college in California that is now closed, and that she had previously taught at Saint Mary-of-the-Woods and at Clarke College. In a March 15, 1938, article, "Please! Dr. Mayer is Math Professor, Not a Freshman!," in the *Setonian*, the Seton Hill student newspaper, she is described as "brimming over with enthusiasm for Saturday morning hikes and moonlight toboggan slides." . . . "Enthusiastic, peppy and eager as she is, she cannot imagine what Seton Hill does without the Pacific Ocean. 'Don't you really miss surf riding?' was her closing remark to the reporter for Setonian."

Mayer's next position was at Xavier University in New Orleans (now Xavier University of Louisiana), the only Catholic institution among the historically black colleges and universities. Material from the Xavier archives includes correspondence related to her position there. In an inquiry of January 1939 from Sedalia, Missouri, to Xavier University, Mayer wrote that she had read with interest their monthly bulletin about the education of "colored young people." She noted that her sister Mary Helen had written to them before but that at the time she, Joanna, "was not well enough to teach large classes." She reported that she was stronger and "would be willing to teach nine or ten hours of Mathematics for the equivalent of board and room and a little spending money, providing by doing so I would be of assistance to your Xavier University. I do not have an appointment for this semester, not that I could not make myself useful at home, but it seems a little selfish to stay at home when I could be of some use to a Catholic college." She wrote that she had taught in well-known Catholic colleges for eight years. She also indicated that she had taught chemistry and education but preferred mathematics and appended a list of courses she had taught. The list includes most courses in the standard undergraduate curriculum plus modern geometry, higher plane curves, advanced calculus, theory of equations, history of mathematics, modern algebraic theory, projective geometry, and invariants.

In August 1939 Mayer received a letter from the president of Xavier University indicating that their mathematics teacher had asked to be released and inviting her to come under the terms she had suggested in her earlier letter. Thus, Mayer began teaching at Xavier in autumn 1939 at about $85 per month, which was to include room and board, "not as salary, ... but as the compensation which would be agreeable to [her]." During the summer of 1940 she was at home in Sedalia, Missouri. A letter of August 1 inquired whether her services would be wanted at Xavier in the fall.

Mayer did return to Xavier for the 1940–41 academic year, but she wrote in February 1941, indicating that her services would not be available after June. She returned to Sedalia, where her father was suffering from cancer. Mayer expressed the hope that they could get back to Oakland, California, by September but was doubtful that her father's health would be good enough for travel. She remained in Sedalia, where he died late in December. Mayer indicated that her mother sold the eighty-acre farm in Missouri, and she and her mother moved to San Jose.

In a letter to Xaxier in the summer of 1942 she mentioned that she hoped to teach at Stanford, but they did not know for certain whether they would need her. She also noted that her mother had grandchildren in the San Francisco Bay area. In August 1942 Mayer wrote to Xavier that she had an offer of a position at San Jose State College but needed a junior college credential; in order to make application for that credential she needed a letter verifying her teaching experience. This she received from Xavier, but it appears that she did not teach anywhere during the year 1942–43. Mayer wrote in a letter to the Marquette graduate school dean in 1956 that she left teaching in 1942 and had supported herself since by buying and selling stocks. It is not clear from Mayer's letters written in the 1980s how she spent the rest of her life, although listings in the AMS and city directories indicate that after she returned to California following her father's death, she spent most of the rest of the 1940s in Santa Clara, California, working at least some of the time as a stenographer. However, in 2011 a niece indicated that for many years Mayer lived

in a house with her mother in San Jose, California. Mayer's mother died in 1960 and Mayer remained in that house, which was located near her brothers and their families, for at least another five years.

Mayer wrote in 1985 that during World War II she served in Washington, D.C., and that in 1950 she did secretarial work for the Guided Missiles Committee, Department of Defense, Pentagon, Washington, D.C. She also wrote that she worked for over thirteen years in military pay, etc. at the military personnel records center in St. Louis. We have not been able to confirm this information.

At various times during her life, Mayer was unable to work because of illness. She was a devout Roman Catholic who lived much of the latter part of her life in San Jose, California. She died at the San Jose Medical Center of cardiac arrest in 1991, two days after having had a mastectomy and a week before her eighty-seventh birthday. Mayer is buried at the Santa Clara Mission Cemetery in California.

Organizational affiliations: AMS, MAA.

Thesis and dissertation:
1928 A geometric interpretation and classification of the invariants of the binary and ternary conics and cubics. MA thesis, Marquette University, directed by Harvey Pierson Pettit. Typescript.
1931 Projective description of plane quartic curves. PhD dissertation, Marquette University, directed by Harvey Pierson Pettit. Typescript. See also **1932**.

Publication:
1932 Projective description of plane quartic curves. *Tôhoku Math. J.* 36:1–21. Published version of PhD dissertation. Reviews: *JFM* 58.0700.03 (M. Steck); *Zbl* 005.21612 (G. Schaake).

Other sources: MA thesis preface 1928; application for social security number 1962; correspondence with Smithsonian Institution and with author 1984, 1985; private correspondence with niece 2011; Xavier University Archives (via Susan Korn); communications with Clarke College Archives, Dominican College Archives, Marquette University Archives, Seton Hill University Archives, and with St. Mary's Academy; US Census 1900, 1910 MO, 1920 OR, 1930 KS; California death certificate; SSDI.

Last modified: September 23, 2015.

MAZUR, Miriam F. (Becker). March 30, 1909–March 5, 2000.
Hunter College (BA 1930, MA 1932), Yale University (PhD 1934).

Miriam Freda Becker was born in New York, New York, the eldest of three children of Lena (Silverman) (ca. 1885–1972) and Joseph David Becker (ca. 1883–1947). Her mother emigrated from Russia in 1902 and her father from Austria in the late 1890s. They married in about 1908 and lived in Manhattan at least through 1920 before moving to the Bronx some time before 1930. Joseph Becker was a life insurance salesman. They had a son, Emanuel, about three years younger than Miriam, and a daughter, Ruth, about five years younger.

Miriam Becker graduated from Hunter College in 1930 with a mathematics major and a physics minor. She remained at Hunter as a graduate student in mathematics, finished her master's thesis in October 1931, and received her master's degree in 1932. She then entered Yale University, with a university fellowship for mathematics, for further graduate work. While at Yale she was awarded a Susan Rhoda Cutler fellowship in mathematics in 1932 and was elected a member of Sigma Xi in 1933. She wrote her dissertation on relative fields under the direction of Oystein Ore, who had come to Yale in 1927, and received her PhD in 1934.

Becker was appointed tutor at Hunter College in 1934 and taught there three years, including the summer of 1935. Articles in the *New York Times* in late 1937 and early 1938 detail a court battle after Becker was terminated from Hunter College at the end of August 1937 with no charges preferred against her. This particular case was part of a larger issue contested between the Teachers Union and the Board of Higher Education regarding the extension to instructors in municipal colleges of regulations governing tenure for teachers in the public school system. In December 1937 the *New York Times* reported that a state Supreme Court justice held "that instructors in colleges maintained by the city may be dropped only on charges after a hearing if they have served a three-year probationary period." Consequently, the Board was directed to reinstate Becker. In March 1938 the Court of Appeals reversed that decision.

After leaving Hunter College, Miriam Becker spent the year 1937–38 at the Institute for Advanced Study in Princeton. The work she did there led to a joint paper with Saunders Mac Lane, who had held a fellowship at Yale 1933–34. The paper, based on a problem suggested by Oystein Ore, was read by Becker at an AMS meeting in 1939 and appeared the following year in the *Bulletin* of the AMS.

In 1938 Becker returned to New York City and taught at George Washington High School, a public high school in Manhattan. On July 7, 1940, Miriam Becker married Abraham Mazur (1911–2000), a biochemist who had received his PhD from Columbia in 1938. He went from fellow to professor and chair in the chemistry department at City College from 1932, when he received his bachelor's degree there, until his retirement in about 1975. City College, often referred to as CCNY, was the College of the City of New York when he was a student but later became the City College of New York of the City University of New York and is now usually referred to as City College (CUNY). Abraham Mazur was also on the faculty 1941–75 at the Cornell University Medical College, in New York City, and was at one time vice president for research at the New York Blood Center.

After the 1940–41 school year Miriam Mazur was transferred from George Washington High School to Samuel Gompers Technical High School in the Bronx, and

temporarily stopped teaching. The Mazurs had two children, Ellen and Stephen. She returned to teaching in 1954 and spent the next eleven years at Brooklyn Technical High School. While at Brooklyn Tech she directed student teachers and taught advanced placement courses.

In January 1964 Miriam Mazur applied for a position at City College (CUNY) and listed Jeanette Keston (Delevie), a fellow student at Yale who was on the faculty there, as a reference. Mazur was assistant professor from September 1964 until she was promoted to associate professor effective January 1, 1972. She remained in that rank until her retirement in September 1977. At City College, Mazur taught a full range of undergraduate courses from remedial algebra and geometry though elective courses, mainly in abstract algebra and number theory. While an assistant professor she was course supervisor for several remedial and introductory courses; from about 1970 she was course supervisor for elective courses. Since at least 2004 awards honoring Miriam Mazur have been presented by the CCNY mathematics department to undergraduate students for outstanding achievement.

Miriam Mazur had been living in New York when she died in 2000 shortly before her ninety-first birthday. She was survived by her husband, sister, two children, and four grandchildren. Her husband died four months later.

Organizational affiliations: AMS, MAA, NCTM, Pi Mu Epsilon, Sigma Xi.

Thesis and dissertation:
1931 [Becker, M. F.] Theory of elementary divisors and applications. MA thesis, Hunter College. Typescript.
1934 [Becker, M. F.] On relative fields. PhD dissertation, Yale University, directed by Oystein Ore.

Publication:
1940 [Becker, M. F.] with S. Mac Lane. The minimum number of generators for inseparable algebraic extensions. *Bull. Amer. Math. Soc.* 46:182–86. Reviews: *JFM* 66.0115.01 (H. L. Schmid); *MR* 1,198f (N. Jacobson); *Zbl* 022.30402 (C. Arf). Presented to the AMS by M. F. Becker, New York City, 28 Oct 1939; abstract: *Bull. Amer. Math. Soc.* 45:662 #300.

References to:
"Rebuffs Teachers' Union." *New York Times*, 17 Nov 1937.
"Dr. Becker Reinstated." *New York Times*, 1 Dec 1937.
"High Court Directs State Police Tests." *New York Times*, 9 Mar 1938.
"Mazur, Miriam Becker." (Death notice) *New York Times*, 7 Mar 2000.

Other sources: Application for social security account number 1956; Center for Research Libraries College Catalog Collection; CCNY Archives; CCNY *Fellowships Newsletter*, Summer 2004; WhoAm 41 (Mazur, Abraham); US Census 1900, 1910, 1920, 1930 NY; SSDI.

Last modified: July 20, 2008.

McCAIN, Gertrude I. July 15, 1879–April 4, 1955.
Indiana University (BA 1908, MA 1911, PhD 1918).

Gertrude Iona McCain was the daughter of Alice A. (Neff) (b. 1855) and Charles Edwin McCain (b. 1854), natives of Indiana who married in Carroll County, Indiana, on December 28, 1876. In 1880 her parents, her two-year-old brother, Christian, and she were living with her maternal grandparents in Three Rivers, Michigan, where she was born. At that time, her father was a grocer. By 1900 her family was living in Delphi, Indiana, and her father was a manufacturer of lime. In 1910 he was described as a foreman in the lime business; in 1920 her widowed father was bailiff at the county court.

McCain graduated from the Delphi high school in 1896, at sixteen. During the next four years she attended Indiana State Normal School for a year and a half and was a teacher in the high school in Delphi from 1897 to 1899. During most of the following decade, she worked, some as a librarian, and did her undergraduate work at Indiana University.

In the fall quarter of 1900, McCain entered Indiana and remained through the spring term 1902. She then interrupted her studies for five years, some of this time as librarian for the Delphi Public Library. In June 1905 she inquired about a place as assistant in the Indiana University library. She wrote to Dr. Robert J. Aley, a member of the mathematics department at Indiana, on June 19, 1905, "I would take the barest living expenses for a salary, if I had time to take some college work. I would like to go on with Mathematics if I have not forgotten too much. I have been in library work two years and expect to attend the school held by the the State Library Commission this summer at Winona" (Indiana University Archives). Apparently McCain did not get the position for she remained at the library in Delphi through the summer of 1907. She was finally able to return to Indiana for the academic year 1907–08 and graduated in 1908 shortly before she turned twenty-nine.

During the next ten years, McCain taught and did graduate work in mathematics. She was principal of the Friends' High School, a Quaker school in Salem, Indiana, 1908–09 and began her graduate studies at Indiana in summer 1909. She continued in the fall term 1909–10 and, after a break, resumed her graduate work in summer 1910. She was a teaching fellow during the academic year 1910–11 and earned one of four master's degrees in mathematics granted by Indiana in 1911. The following year, 1911–12, McCain was a fellow in mathematics at Bryn Mawr College, where it is recorded that she gave a talk on discontinuous groups at the Bryn Mawr Mathematical Journal Club. In February 1912 McCain asked for a recommendation from Indiana to support an application for a position at Wilson College, which she apparently did not get.

In at least 1912 McCain was again teaching at the high school in Delphi, giving instruction in both mathematics and English, although she was also doing graduate work at Indiana University in the winter and spring terms of 1913–14. She continued with a fellowship at Indiana the academic year 1914–15. She was also president of the Graduate Club in 1914. In 1915 McCain took a position as professor of mathematics at Oxford College for Women (later merged with Miami University) in Oxford, Ohio, where she remained for six years. During this period, in 1918, at

nearly thirty-nine, she completed the work for her PhD at Indiana with a minor in philosophy, which at that time included psychology.

McCain left Oxford College in 1921, taught at Hunter College in New York City that summer, and in September 1921 became professor at Westminster College in New Wilmington, Pennsylvania, where she remained until June 1928. She started teaching at the State Teachers College (now Radford University) in East Radford, Virginia, in the summer quarter 1929 and remained as professor until the end of the academic year 1930–31. In June 1931 she requested that a transcript of her work at Indiana be sent to the Department of Education in Sacramento, California. She wrote that she hoped to get located in California that year. She was applying for a general secondary credential but had insufficient hours in courses designated as education courses and so was not eligible to apply.

In 1931–32 McCain taught mathematics as a professor at Marymount College in Salina, Kansas, before Sister Mary Nicholas Arnoldy assumed the position there. In September 1933 McCain was still trying to get secondary credentials in California and asked that the many courses in philosophy (which included psychology) that she had taken at Indiana be itemized, which they were. Again she was unsuccessful. According to MAA membership lists, she was living in her hometown of Delphi in 1933–34 and in East Radford, Virginia, in 1935–36, in both cases without a professional affiliation. She was professor of mathematics and physics at Brenau College, a private women's college in Gainsville, Georgia, in the academic year 1937–38. While there she also served as the head of the house for a sorority on campus. There is no indication of any professional activity after this time although she sought a position at Athens College in Alabama in 1940 when she was sixty, presumably when she learned of the retirement of Kathryn Wyant because of illness.

From December 1915, when McCain attended the organizational meeting of the MAA at Ohio State University, until the late 1930s, she maintained her affiliation with the MAA and submitted problem solutions to the *Monthly* over a period of about twenty years. She also joined the AMS in 1915 but appears to have dropped her membership about the time she left State College in Radford.

At some point McCain returned to Delphi, Indiana, where she was a member of the Presbyterian Church. She was also a fifty-year member of the Rose Chapter of the Order of the Eastern Star.

Gertrude McCain suffered from cardio-vascular-renal disease and generalized arthritis for several years before her death in 1955 at age seventy-five in the Deer Creek nursing home near Delphi in Carroll County, Indiana. She had been a patient at the nursing home for two weeks at the time of her death. She was survived by a niece and nephew in Delphi and two grand-nephews and was buried in the IOOF (Independent Order of Odd Fellows) cemetery in Delphi.

Organizational affiliations: AMS, MAA (charter member).

Thesis and dissertation:
1911 Theory of the absolute. MA thesis, Indiana University.
1918 Series of linear iterated fractional functions – character of the functions. PhD dissertation, Indiana University.

References to: AmMSc 3.
"Gertrude McCain Dies Monday in Nursing Home." *Delphi* (IN) *Citizen*, 7 Apr 1955.

Other sources: Bryn Mawr College Archives; Indiana University Archives; Miami University (OH) Archives; communications with Brenau University Alumni Affairs Office, Delphi Public Library, Indiana University Alumni Association, Sisters of St. Joseph Archives, Westminster College Archives; US Census 1880 MI, 1900, 1910, 1920, 1930 IN; Indiana death certificate.

Last modified: December 12, 2008.

McCOY, Dorothy. August 9, 1903–November 21, 2001.
Baylor University (BA 1925), University of Iowa (MS 1927, PhD 1929).

Dorothy McCoy was born in Waukomis in Oklahoma Territory, four years before Oklahoma attained statehood. She was the elder of two children of Susan Ellen (Holmes) (1876–1941) and Stephen Franklin McCoy (1860–1906). Her mother was born in Kansas but grew up in Lawrence County in southwestern Missouri and attended a few short terms at a country school. Her father, born in Alabama, was a farmer who homesteaded in Oklahoma. He had almost no education but did learn to read and write. Her parents were married in 1902. Her younger brother, Neal Henry, was born on March 6, 1905.

After Dorothy McCoy's father died in 1906, her mother and the two young children moved to Chesapeake in Lawrence County, Missouri, where her mother still had family. There Dorothy and Neal attended a one-room elementary school before the family moved to nearby Marionville where the children attended high school. After Neal skipped the seventh grade, the two of them did almost all of their further schooling together. Dorothy McCoy wrote in 1985 that her mother was very ambitious for both her children.

After Dorothy and Neal McCoy graduated from high school in 1921, the family moved to Waco, Texas, where they both attended Baylor University, a Baptist school. After they graduated from Baylor with honors in 1925, both taught in high school for a year in Texas; Dorothy was in Port Arthur. Together they then began their graduate work at the State University of Iowa, the official name of the University of Iowa, in Iowa City in July 1926. They earned their master's degrees a year later and continued with their work for the doctorate. Dorothy McCoy's major field of study was mathematics with a first minor in education and a second minor in psychology. She wrote her dissertation in topology under the direction of E. W. Chittenden; Neal's dissertation was on commutation formulas in the algebra of quantum mechanics and was also directed by Chittenden. Both Dorothy and Neal received their doctorates in 1929. While at Iowa Dorothy held a scholarship for one year, a fellowship for the year 1927–28, and a graduate assistantship during 1928–29, her last year there. Dorothy McCoy was the only woman to receive a doctorate in mathematics at Iowa before 1940.

Neal McCoy held a National Research fellowship at Princeton for the two years after receiving his PhD and then joined the faculty at Smith College, where he had a distinguished career as a researcher and teacher. He was particularly noted as the author of textbooks in abstract algebra. He retired in 1970.

Immediately after receiving her PhD, Dorothy McCoy went to Belhaven College in Jackson, Mississippi, as professor and head of the mathematics department. During her twenty-year tenure there, Belhaven was a women's college affiliated with the Presbyterian church. While there, she sponsored the Baptist Student Union. In the summer of 1930 she taught as a visitor at Baylor, while during the summer quarter of 1931, she attended classes at the University of Chicago as a visiting PhD. According to her obituary she also studied during a summer at Columbia University. In 1933 she joined the editorial board of the *Mathematics News Letter*, then an independent journal that had been published under the auspices of the Louisiana-Mississippi Section of the MAA and the Louisiana-Mississippi Branch of the NCTM until the end of 1931. In 1934 the journal changed its name to *National*

Mathematics Magazine, and McCoy remained on the board until its last issue under that name in 1945; in 1947 it resumed publication as *Mathematics Magazine*. Also during this time McCoy was active in the Louisiana-Mississippi Section of the MAA. She served as secretary of the section 1932–37, chairman 1937–38, and vice chairman for Mississippi 1938–39.

The attraction of teaching in a Baptist college contributed to McCoy's decision to move to Wayland Baptist College (now University) in Plainview, Texas, in 1949, two years after it became a four-year college. She went as professor of mathematics and chairman of the division of physical and biological sciences. During the academic year 1953–54, she was a Fulbright professor at Baghdad University in Iraq. She also attended institutes for college teachers in Boulder, Colorado, during the summer of 1953; at Vanderbilt University for one summer and a semester; and at Washington State University. Between 1954 and 1958 she worked one summer at Patrick Air Force Base in Florida and two summers at the Aberdeen Proving Ground in Maryland. She also taught one summer at Northwestern State Teacher's College (now Northwestern Oklahoma State University) in Alva, Oklahoma. She was visiting professor at the University of Hawaii in summer 1958 and at Baylor in summer 1961. Her obituary indicates that she also taught for a summer at the University of New Mexico. She served on the council of the AAUP in the early 1960s. She remained chairman of the division of physical and biological sciences at Wayland Baptist until 1972.

In 1975 McCoy retired as distinguished professor emeritus of mathematics. After her retirement she spent six months as a teacher of children of missionaries in Malawi in southeastern Africa; a year later she worked for three months at a similar school in Indonesia. These experiences caused her to found a mission interest group in Plainview; she remained involved with that group for the remainder of her life.

The Dorothy McCoy lecture series was established in 1980, she received the Wayland Alumni Association plaque for distinguished service to students in 1982, and she was given the Roy McClung Service plaque for her concern for foreign students at Wayland Baptist. In 1999 she was the first to receive the Distinguished Lifetime Service Award from the Association of Former Students. A bust, created by a former art teacher at Wayland, has been on display at the library. In September 2001 she was one of the first two inductees into the Division of Mathematics and Science hall of honor at Wayland Baptist.

Dorothy McCoy was a Southern Baptist and was active in the First Baptist Church in Plainview. She had many hobbies over the years, including travel, photography, and in later years, bird watching. According to her obituary, her travels included Central America, South America, and India, in addition to her trips to Iraq and Africa. She maintained her home in Plainview, but continued to visit her brother, Neal, in Massachusetts until both were well into their nineties. Neal McCoy died in Northampton on January 4, 2001. According to a communication from Janet Seright, a friend in Plainview, Dorothy McCoy remained active, drove her car, and was still involved in church and mission activities until September of that year.

On September 27, 2001, Wayland Baptist dedicated in Dorothy McCoy's name a recently acquired and renovated property to serve as a senior men's honors dormitory. The day after the dedication she moved from her home to Prairie House

Living Center, an assisted living facility in Plainview, where she died at age ninety-eight less than two months later. She is buried in Plainview Memorial Park. The family suggested that memorials be made to the Dorothy McCoy scholarship fund for mathematics at Wayland Baptist University.

Organizational affiliations: AMS, MAA, AAUP, Sigma Xi.

Thesis and dissertation:
1927 A study of complex roots of polynomials. MS thesis, University of Iowa, directed by Roscoe Woods.
1929 The complete existential theory of eight fundamental properties of topological spaces. PhD dissertation, University of Iowa, directed by Edward Wilson Chittenden. Printed version, 1930, reprinted from *Tôhoku Math. J.* 33:88–116.

Publications:
1930 The complete existential theory of eight fundamental properties of topological spaces. *Tôhoku Math. J.* 33:88–116. Published version of PhD dissertation. Review: *JFM* 56.1123.05 (E. Pannwitz). Presented to the AMS, Des Moines, IA, 31 Dec 1929; abstract: *Bull. Amer. Math. Soc.* 36:211 #167.
1932 Axioms and their relations to secondary school mathematics. *Math. News Lett.* 6 (4): 11–14. Presented to a meeting of the NCTM, Natchtoches, LA, 13–14 Mar 1931.
1935 Space. *Natl. Math. Mag.* 9:155–62.
1936a Continuous transformations of finite homogeneous spaces. *Natl. Math. Mag.* 10:212–18. Review: *JFM* 62.1406.06 (G. Aumann). Presented to the AMS, Pittsburgh, PA, 28 Dec 1934; abstract: *Bull. Amer. Math. Soc.* 41, no. 1, pt. 2: 28–29 #39.
1936b Review of *A Mathematician Explains*, by M. I. Logsdon. *Natl. Math. Mag.* 10:236.
1937 Review of *First Year of College Mathematics*, by R. W. Brink. *Natl. Math. Mag.* 12:103–04.
1938 Review of *Plane Trigonometry*, by C. N. Mills, E. Atkins, and E. F. Scott. *Natl. Math. Mag.* 12:419–20.

Abstracts not listed above:
1934 Combinations of abstract spaces. *Amer. Math. Monthly* 41:474 #2. Presented to the MAA, Jackson, MI, 24 Mar 1934.
1949 Undergraduate mathematics in our Louisiana-Mississippi Section. *Amer. Math. Monthly* 56:587 #2. Presented to a meeting of the MAA, Oxford, MI, 8–9 Apr 1949.

Presentations not listed above: "The social studies curriculum and mathematics." Presented to the NCTM, Baton Rouge, LA, 30 Dec 1940 meeting.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P–13P, 14–21; BioWMath.
"Wayland to Dedicate Honors Dorm to Former Faculty Member." Wayland Baptist University news release, 5 Oct 2001.
"Dr. Dorothy McCoy." (Obituary) *Plainview (TX) Daily Herald*, 22 Nov 2001.
"Longtime Wayland Supporter, Former Professor Dies. " Wayland Baptist University news release, 29 Nov 2001.
Hutchinson, Joan P. and Larry Riddle. "Dorothy McCoy (1903–2001). " *AWM Newsletter* 32 (Jan–Feb 2002): 8–9.

Other sources: PhD dissertation abstract biography 1930; Owens questionnaire 1937; Smithsonian questionnaire 1985; correspondence between D. McCoy and J. Hutchinson Feb–May 2001, shared with the authors; communication from Janet Seright to Joan Hutchinson Dec 2001; US Census 1880, 1910, 1920 MO, 1930 MS.

Last modified: August 21, 2010.

McDONALD, Emma (Whiton). August 3, 1886–July 7, 1948.
Colorado College (BA 1909), University of California (MA 1916, PhD 1932).

Emma Kirtland Whiton was born in Brooklyn, New York, the daughter of Ella E. (Lewis) (b. 1851) and Erastus T. Whiton (b. 1849), both originally of Connecticut. In 1900 the family was living in Pueblo, Colorado, her parents had been married twenty-three years, and two children were living of three born. Emma Kirtland's older sister was Myra Eleanor (b. 1882), who was also born in New York; their father was an undertaker.

Emma Whiton graduated from Centennial High School in Pueblo, Colorado, in 1904. It appears that she taught for a year there before entering Colorado College in Colorado Springs, where she earned her bachelor's degree cum laude in 1909. Florian Cajori was the head professor of mathematics there at that time. While at Colorado College, her activities included Hypatia (a literary and social club), the Dramatic Society, Dais, the YWCA, and the YWCA cabinet. After her graduation, she returned to Centennial High School, where she taught history 1909–11 and then mathematics until about 1916. She is listed in all of the school yearbooks 1909–1916 except for the year 1914–15. She is listed as being at a high school in Pueblo in the April 1916 list of charter members of the MAA. The membership list published later that year lists her as a graduate student at the University of California living in a hotel in Berkeley. Her master's thesis, written under the direction of J. H. McDonald, was completed and approved by December 1916. Whiton was in residence at the university 1916–17 and the first semester 1917–18, when she was a PhD candidate in mathematics.

Whiton was professor of mathematics at the University of Redlands in southern California from January 1918 until 1923, when she joined the faculty as associate professor at Mills College. She was at Mills a year and a half before resigning in January 1925. She and her master's thesis advisor, John Hector McDonald (1874–1953), had married on December 19, 1924, when she was head resident of Mills Hall and on the faculty at Mills. J. H. McDonald was born in Toronto, Ontario, Canada, earned his PhD as a student of Oskar Bolza at the University of Chicago in 1900, and joined the faculty at California in January 1902.

In May 1932 Emma Whiton McDonald took her final exam for her PhD at the University of California. Her dissertation in number theory was directed by D. N. Lehmer, and her minor subject was astronomy.

Emma Whiton McDonald used the name Mrs. J. H. McDonald in MAA membership lists in the late 1920s. She used Mrs. Kirtland McDonald in the 1933–34 membership list and published her dissertation in 1934 under the name Kirtland McDonald. It appears that she and J. H. McDonald were living separately by 1930 and at some point were divorced. In 1944 he married Sophia Levy, a member of the mathematics faculty at Berkeley who had a PhD in astronomy.

The last entries in MAA directories for Mrs. Kirtland McDonald are in 1933–34 at a hotel in Los Angeles and in 1935–36 with her address unknown. No record of further professional activity in mathematics has been found, although she worked for some years as a real estate broker in southern California. She lived in San Marino and in South Pasadena. She was a member of the Daughters of the American Revolution.

Emma Kirtland McDonald had been living in South Pasadena, California, for seven years before her death there from cancer at age sixty-one in 1948. She was cremated and her ashes were interred at Forest Lawn Memorial Park in Glendale, California.

Organizational affiliations: AMS, MAA (charter member).

Thesis and dissertation:
1916 [Whiton, E. K.] On the fixed centrode of three-bar motion. MA thesis, University of California, directed by John Hector McDonald. Typescript.
1932 Magic cubes which are uniform step cubes. PhD dissertation, University of California, directed by Derrick Norman Lehmer. Typescript. Printed version, 1934, reprint of *Univ. California Publ. Math.* 2:197–215.

Publications:
1926 Determination of the reducible cases of the fixed centrode of three-bar motion. *Amer. Math. Monthly* 33:90–93.
1934 Magic cubes which are uniform step cubes. *Univ. California Publ. Math.* 2:197–215. Published version of PhD dissertation. Reviews: *JFM* 60.0876.02 (F. Behrend); *Zbl* 009.29703 (N. G. W. H. Beeger).

Abstract not listed above:
1931 Magic cubes which are uniform step cubes. *Bull. Amer. Math. Soc.* 37:354 #230. Presented by title to the AMS, Seattle, WA, 13 Jun 1931.

References to:
"Head Resident at Mills Weds U.C. Professor of Mathematics." *Oakland Tribune*, 19 Dec 1924.
"McDonald – Mrs. Kirtland W. McDonald." (Obituary) *Pasadena Star-News*, 8 Jul 1948.

Other sources: University of California Archives; communications with Colorado College Archives, Centennial High School (Pueblo, CO) researcher, Pasadena Public Library, and University of Redlands Archives; University of California: In Memoriam, [1957], 98–100 (McDonald, John Hector); US Census 1880 NY, 1900, 1910, 1920 CO, 1920 CA, 1930 CA; California death certificate.

Last modified: December 12, 2008.

McFARLAND, Dora. April 18, 1895–November 26, 1987.
Monmouth College (BA 1916), University of Oklahoma (MA 1921), University of Chicago (PhD 1936).

Dora McFarland was born near Aledo, Illinois, the first of two children of Nell (Blayney) (1868–1912) and Edmund Curry McFarland (1866–1938), natives of Illinois who married in 1893. In 1900 this farm household also included a son, James Russell (b. 1897); Edmund McFarland's father; and a boarder.

Dora McFarland attended grade school and high school in Aledo, a small town in the northern part of the state near the Mississippi River. She then attended nearby Monmouth College. After her graduation from college in 1916, she taught in high schools for a number of years: in Gravity, Iowa, 1916–17; Aledo, Illinois, 1917–19; and Sterling, Illinois, 1919–20.

In the summers of 1919 and 1920 McFarland took classes at the University of Oklahoma before completing her work for her master's degree in 1921. She joined the faculty there as instructor in 1921. Except for the years she was in residence at Chicago for her doctoral work and for leaves, McFarland remained at Oklahoma the rest of her career. She was instructor 1921–27, assistant professor 1927–39, associate professor 1939–48, professor 1948–65, and emeritus professor after her retirement in 1965 at the age of seventy.

McFarland attended the University of Chicago for four quarters beginning in fall 1924 while on leave from Oklahoma. While on a sabbatical in 1928–29, she returned to Chicago on a fellowship for four more quarters. She also took courses in spring and summer 1936 and finished her dissertation in division algebras as a student of L. E. Dickson. She joined the AMS shortly after receiving her doctorate in 1936 and remained a member the rest of her life.

In addition to teaching, which was her main contribution at Oklahoma, McFarland did committee and administrative work and sponsored student organizations. During the 1930s and early 1940s she often served as an officer or sponsor of the Oklahoma chapter of Pi Mu Epsilon, and in 1945–46 she served as chair of the Oklahoma Section of the MAA. In the mid-1950s she contributed to a series of tape recordings made by members of the faculty and sold under the name "Tapes for Teaching." McFarland's contribution was "What should a high school student expect from mathematics?" She also ran several summer institutes for school mathematics and science teachers. Much of her teaching at the University of Oklahoma was in mathematics education. In the early 1960s, she and Eunice M. Lewis, a colleague in the education department, produced notes for an introductory course on arithmetic for elementary teachers; in 1966 they published a more comprehensive textbook for the same audience. In a review in *Choice* magazine, the book was compared favorably with the National Council of Teachers of Mathematics' 29th Yearbook, *Topics in Mathematics for Elementary School Teachers*, and was "highly recommended" (4 (1967): 712).

McFarland was active in a number of organizations not related to mathematics. She was an elder in the Presbyterian church; was a member of the national board of the YWCA; and was the Oklahoma founder, president, and international first vice president of Delta Kappa Gamma, an honorary society for women in education. She was also a member of Kappa Alpha Theta social sorority and in the early 1960s described herself as a Democrat.

McFarland was a recipient in 1949 of the Matrix Table award given by Theta Sigma Phi (now Women in Communications, Inc.). In 1953 she was presented with the $500 University of Oklahoma Foundation teaching award that "was made for 'extraordinary excellence in student counseling and teaching of freshman and sophomores'" (*Amer. Math. Monthly* 61:66). In 1960 she received the Delta Kappa Gamma International achievement award. Gamma State, the Oklahoma state organization of the Delta Gamma Kappa Society International, now offers a Dora McFarland scholarship for one year of graduate study to a member of the society who is a resident of Oklahoma.

McFarland took her last leave in the fall of 1959 to take a trip to India and Southeast Asia. Dora McFarland was living in Norman, Oklahoma, at the time of her death at age ninety-two in 1987. She was survived by a niece, two nephews, and several great-nieces and great-nephews.

Organizational affiliations: AMS, MAA, AAUP, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Dissertation:
1936 Division algebras defined by non-Abelian groups. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, distributed by the University of Chicago Libraries.

Publications:
1963 with E. M. Lewis. *Arithmetic for Elementary Teachers: An Introductory Course*. Norman, OK: University of Oklahoma.
1966 with E. M. Lewis. *Introduction to Modern Mathematics for Elementary Teachers*. Boston: D. C. Heath. Reviews: *Amer. Math. Monthly* 74:891 (Telegraphic Review); *Choice* 4:712; *Math. Gaz.* 52:292–93 (M. Hayman). Reissue and 2nd ed.: 1968 and 1973 as *Introduction to Modern Mathematics*. Review: *Amer. Math. Monthly* 81:539 (Telegraphic Review, S. Galovich).

Abstract not listed above:
1937 Associativity conditions for division algebras defined by non-Abelian groups of three generators. *Amer. Math. Monthly* 44:343 #3. Presented to the MAA, Tulsa, OK, 5 Feb 1937.

References to: AmMSc 4–8, 9P–11P; AmWom 1935–40; WhoAmW 1–2.
"Dr. Dora McFarland." (Obituary) unidentified newspaper clipping.

Other sources: PhD dissertation vita 1936; Owens questionnaire 1937; communications with University of Oklahoma Western History Collections and the Office of the Senior Vice President and Provost; US Census 1900, 1910, 1920 IL, 1930 OK.

Last modified: December 17, 2010.

McKEE, Ruth (Stauffer). July 16, 1910–January 9, 1993.
Swarthmore College (BA 1931), Bryn Mawr College (MA 1933, PhD 1935).

Ruth Caroline Stauffer was the second of three children of Hannah (Henry) (1876–1961) and Charles Christian Stauffer (1880–1968), a physician. Both parents were born in Boyertown, Pennsylvania. Her father received degrees from Franklin and Marshall College and the Medical School of the University of Pennsylvania. Her mother earned a certificate from the Keystone Normal School (later Kutztown State Teachers College, now Kutztown University of Pennsylvania) and was an elementary school teacher in a one-room schoolhouse in Boyertown before her marriage in 1905; after her marriage she worked as the first assistant in her husband's office. All three children were born in Harrisburg and received their undergraduate degrees from Swarthmore. Ruth Stauffer's sister, Martha J. (1909–1991), received an MA from Columbia, studied at Harvard, and was a mathematics teacher in a high school and in a community college in Harrisburg. Ruth Stauffer's brother, Charles Henry (1913–1997), received a master's degree and a PhD in physical chemistry from Harvard, and was a chemistry professor at Worcester Polytechnic Institute, St. Lawrence University, and Bates College.

Ruth Stauffer received her elementary and secondary education in the public schools of Harrisburg, Pennsylvania; she graduated from the all-girls Central High School at age fifteen in 1926 and did an additional year at the new coeducational William Penn High School before enrolling at Swarthmore College. She originally intended to take pre-med courses at Swarthmore. As she said in 1981, "I wanted to be an MD for a long time, and when I went to college I took pre-med courses, but I didn't do too well. . . . In the meantime, math was easy! So I took more math classes because they were easy. . . . I think that this is maybe important . . . I went to a girls' high school; we had excellent math teachers. They were women who went to places like Wellesley, and they were inspirations" (Smithsonian tapes). She earned her undergraduate degree at Swarthmore in 1931 with a major in mathematics and with honors in mathematics, physics, and chemistry. Arnold Dresden was her teacher and advisor there, and she considered him a friend throughout his life.

It was Dresden who urged Stauffer to go to Bryn Mawr College and who helped her obtain the mathematics graduate scholarship there for her first year, 1931–32. She received her master's degree in 1933 and continued her work at Bryn Mawr the following year as a scholar of the Society of Pennsylvania Women in New York. At Bryn Mawr she studied with Anna Pell Wheeler, Emmy Noether, Gustav A. Hedlund, and Marguerite Lehr. Of Pell Wheeler she later wrote, "She continued to be interested in me, my family, and my work her entire life, coming to Harrisburg by train as late as the 1960's to visit us" (Smithsonian questionnaire 1981). Stauffer, who was Noether's only doctoral student in the United States, was one of four women who studied with Noether at Bryn Mawr in 1934–35. The other three, with postdoctoral scholarships or fellowships, were Marie Weiss, PhD Stanford University 1928; Olga Taussky (Taussky-Todd), PhD Vienna 1930; and Grace Shover (Quinn), PhD Ohio State University 1931. Accounts of their experiences that year appear in **1983**. Emmy Noether, whom Stauffer later described as "teacher, PhD Director, and encouraging friend" (Smithsonian questionnaire), died suddenly in April 1935, a great blow to Stauffer. Her doctoral examination was given by Richard Brauer, then at the Institute for Advanced Study. After receiving her degree in June 1935

Stauffer spent the following year, 1935–36, teaching mathematics at the Bryn Mawr School in Baltimore and doing postdoctoral work in algebra with Oscar Zariski at the Johns Hopkins University. She taught mathematics at Miss Fine's School in Princeton, New Jersey, 1936–37.

During her last year at Bryn Mawr College, Ruth Stauffer met George W. McKee, then a law student in Philadelphia, and also from Harrisburg. Even though they were almost neighbors in Harrisburg they had not known one another there. They married in 1937. George McKee was born in 1908 and graduated from Princeton in 1931 and from the University of Pennsylvania Law School in 1934. He had his own law practice in Harrisburg from 1936 until 1990, although he was semi-retired from about 1980. He served as a lieutenant in the US Navy during World War II.

During 1938–39, while living in Harrisburg, Ruth McKee taught algebra as an instructor at Bryn Mawr; however, after becoming pregnant, she was too ill to continue commuting to Bryn Mawr. Their first daughter, Clara, was born in October 1939 and their second, Martha, in December 1941. Clara McKee Rader received a bachelor's degree from Bryn Mawr and a master's degree in English from Yale and taught English; she is a pastor's wife and has been active in family and marriage counseling and in religious education. Martha McKee Keyser received her bachelor's degree from Swarthmore and did graduate work in psychology at Temple University and the University of Pennsylvania. She taught English and now works as a family therapist.

Ruth McKee wrote in 1981 that "work in mathematics came to a halt when the girls were born" (Smithsonian questionnaire). In 1953, about a dozen years after her youngest daughter was born, McKee began her employment with the Joint State Government Commission in Harrisburg. As an analyst she did mathematical statistics for this non-partisan research agency for the Pennsylvania state legislature until her retirement in 1980. She planned and directed analyses and reports of the commission in areas such as efficiency of Pennsylvania state mental hospitals, traffic safety laws, costs of state owned and related colleges and universities, equalization of public school subsidies, and retirement costs as related to proposed liberalization of benefits. In her 1981 questionnaire McKee credited Noether's "methods of working and thinking" as greatly influencing her "approach to problem solving at the Joint State Government Commission."

Ruth McKee's non-mathematical interests included story telling (she was a member of the National League of Story Tellers), sketching and oil painting, weaving, bird watching, the Girl Scouts (she was a leader), and teaching in Sunday School of the United Church of Christ. She was involved with parent education groups through various local civic clubs in Harrisburg. In the mid-1960s the McKees winterized, and moved to, Ruth McKee's parents' former summer home in Dauphin, just northwest of Harrisburg.

In 1980 George and Ruth McKee moved to Pennswood Village, a retirement community in Newtown, Pennsylvania. While there they were both active in volunteer work, he as a president of the Pennswood Village's resident association and she as a contributor to budgeting and planning for the association. They had many friends there and made trips to Princeton for art shows and lectures. Ruth McKee also resumed her interest in art and was able for the first time to work in three dimensions and develop her abilities in sculpture. Also, in her retirement she became active in the Society of Friends. Ruth McKee's older daughter said in a phone

conversation with one of the authors that she had an amazing combination of gifts and "made a huge impression on all of us. She had friends of all ages." Ruth McKee died at Pennswood Village at age eighty-two in 1993. George McKee died there just over two years later.

Organizational affiliations: AMS, AAUW.

Dissertation:
1935 [Stauffer, R.] The construction of a normal basis in a separable normal extension field. PhD dissertation, Bryn Mawr College, directed by Emmy Noether. Printed version, 1936, reprinted from *Amer. J. Math.* 58:585–97.

Publications:
1936 [Stauffer, R.] The construction of a normal basis in a separable normal extension field. *Amer. J. Math.* 58:585–97. Published version of PhD dissertation. Reviews: *JFM* 62.0109.01 (E. Trost); *Zbl* 014.19801 (M. Deuring).
1982 with B. A. Case, N. J. Owens, D. V. Widder, and V. A. Widder. Anna Johnson Pell Wheeler (1883–1966): Colloquium Lecturer, 1927. *AWM Newsletter* 12 (4): 4–13. Remarks made at Symposium sponsored by the AWM, Ann Arbor, MI, 20 Aug 1980. Adaptation: 1996. "Reminiscences about Anna Johnson Pell Wheeler." In *A Century of Mathematical Meetings* ed. B. A. Case, 311–19. Providence, RI: American Mathematical Society.
1983 with G. S. Quinn, M. Lehr, and O. Taussky. Emmy Noether in Bryn Mawr. In *Emmy Noether in Bryn Mawr,* eds. B. Srinivasan and J. Sally, 139–46. New York: Springer-Verlag. Presented as part of "Emmy Noether at Erlangen, Göttingen, and Bryn Mawr," panel discussion at AWM Symposium in Honor of Emmy Noether's 100th Birthday, Bryn Mawr, PA, 18 Mar 1982. Review: *Zbl* 557.01012 (I. Schneider).

References to: AmMSc 10P–11P; AmMWSc 12P–13P, 14–16.
Kenschaft, Pat. "A Career of Mathematics in Government: Ruth Stauffer McKee." *AWM Newsletter* 41, no. 3 (2011): 19–22. Written in 1992.

Other sources: PhD dissertation vita 1935; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; telephone conversation with Clara McKee Rader, 1 Dec 2000; Bryn Mawr College alumnae records.

Last modified: May 17, 2011.

McMILLAN, Audrey (Wishard). July 7, 1914–January 10, 2008.
Northwestern University (BS 1935), Radcliffe College (MA 1936, PhD 1938).

Elizabeth Audrey Wishard was born in Jubbulpore (now Jabalpur), India, the only child of Lena (Linn) (1887–1973), born in Sumner, Iowa, and Glenn Porter Wishard (1883–1956), of Clinton, Indiana. Her parents both received bachelor's degrees from Northwestern University in 1907 and married in July 1908. Her father was YMCA secretary, foreign service, and served in Jubbulpore 1910–15; Bangalore, India, 1919–22; Colombo, Ceylon (now Sri Lanka), 1923–33; and Manila, (US) Commonwealth of the Philippines (now Republic of the Philippines), 1936–45. Between his two India postings he apparently attended the University of Chicago and received a master's degree in about 1919. Audrey Wishard first attended the Kodai School (now the Kodaikanal International School), a boarding school founded primarily for the education of children of American missionaries, in southern India. In 1927 she and her mother moved to Pasadena, California, where she continued her schooling. Her parents were divorced in 1932.

Audrey Wishard attended Pasadena Junior College in California 1929–31 before entering Northwestern University, from which she graduated in 1935. It was noted in her obituary that at Northwestern she studied "as much mathematics as possible, and then as much painting as there was time for," and that she worked as a waitress in an adult YMCA camp in Wisconsin in the summers. She studied at Radcliffe College the next three years and earned a master's degree in 1936 and a doctorate in 1938 with a dissertation in analysis directed by Lars V. Ahlfors. She was a graduate student assistant her last two years at Radcliffe.

The next four years, 1938–42, Audrey Wishard was an instructor at Vassar College. Presumably she replaced Marie Weiss who had moved back to Sophie Newcomb College in 1938. While at Vassar, Wishard taught trigonometry and analysis, differential calculus, projective geometry, and solid geometry. When Wishard left Vassar, Frances Baker, who had been at Mount Holyoke the previous seven years, joined the Vassar faculty as associate professor.

In June 1942 Wishard moved to Princeton, New Jersey, where she was to become a member of the Institute for Advanced Study in the fall. In Princeton she was introduced to Brockway McMillan and on September 2, 1942, they were married. Brockway McMillan was born on March 30, 1915, in Minneapolis, Minnesota. He attended Armour Institute of Technology (now Illinois Institute of Technology) in Chicago 1932–34 and received a bachelor's degree in 1936 and a PhD in 1939 from MIT. He was a Proctor fellow, Fine instructor, and research associate at Princeton University 1939–42.

In 1942–43 Audrey McMillan was a member of the School of Mathematics and an assistant to Hermann Weyl at the Institute for Advanced Study. Starting in 1942 her mother worked as a clerk at the Educational Testing Service, also in Princeton, and remained in that position until 1960. Brockway McMillan became an ensign in the US Naval Reserve after completing officer training school and was later a lieutenant. They were both in Dahlgren, Virginia, starting in early summer 1943, and Audrey McMillan worked for the Bureau of Ordnance as an associate in mathematics at the US Naval Proving Ground there. The McMillans remained in Dahlgren through 1945, when, at the end of December, he was ordered to Los Alamos in New Mexico.

In 1946 Brockway McMillan began a long association with Bell Telephone Laboratories, where he worked most of the next thirty years. From 1946 to 1961, he was at Bell Labs in Murray Hill, as research mathematician 1946–55, assistant director of systems engineering 1955–59, and director of military research 1959–61. From 1961 to 1965 he was with the US Air Force in Washington, D.C., as assistant secretary for research and development 1961–63 and as under secretary 1963–65. In 1965 he returned to Bell Labs in Whippany, New Jersey, where he was executive director for military research 1965–69 and vice president for military systems 1969–79. He was elected to the National Academy of Engineering in 1969.

The McMillans had three children during the 1940s and early 1950s. Sarah Linn was born in 1946 in Los Alamos, New Mexico; Douglas Wishard was born in 1947 in Summit, New Jersey; and Gordon Brockway was born in 1952 in Boston, Massachusetts. Sarah earned a BA degree from Radcliffe in 1968 and a PhD degree from Yale in 1979 in Far Eastern languages and literature; she has worked primarily as a computer scientist in computational linguistics. Douglas received a bachelor's degree from Harvard in 1969, a master's degree in architecture from the University of California, Berkeley, in 1976, and an MBA from the Wharton School, University of Pennsylvania, in 1983. He was vice president of a bank for several years and later went into business for himself. Gordon received a bachelor's degree from the University of California, Berkeley, in 1980 and has worked mainly as a computer programmer and computer software consultant.

Audrey McMillan wrote in 1997, "I do not think it possible to care for 3 small children and do mathematical research. I tried. Unfortunately, I did not realize that, at age 50, I might have been able to" (authors' questionnaire). Instead, she turned her attention to elementary school teaching and consulting, which interested her because of the "new math." When they were living in Washington, D.C., in 1961–65, she was an instructor at the Georgetown Day School. In the summer of 1967, she taught a course in "new math" for elementary school teachers at New York University, where she developed teaching materials for early primary students. She was a consultant to the Summit, New Jersey, board of education 1966–76 and led seminars in local schools.

McMillan was a Democrat since 1936, and she was a Unitarian 1948–1970. Her hobbies were painting (realistic oils and watercolors) and music (listening, piano, and choral singing). In 1980, shortly after their retirement, the McMillans moved from Summit, New Jersey, to Sedgwick, Maine, a small town midway up the Maine coast where they had summered since 1967. From 1982 to 1986 Audrey McMillan was active in the Four Town Nursing Service, which she served as treasurer 1984–86. For fifteen years, 1981–96, she was a member of the Sargentville Thursday Club, of which she was treasurer for about five years. Brockway and Audrey McMillan both served on the board of overseers for the Kneisel Hall Chamber Music Festival in nearby Blue Hill, Maine. After retiring, the McMillans traveled to Greece, France, Britain, and Alaska. Audrey McMillan died at her home in Sedgwick, Maine, in January 2008, after an illness of just over a year. She was ninety-three. She was survived by her husband, three children, seven grandchildren, and four great-grandchildren.

Organizational affiliations: AMS, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1937 [Wishard, A.] Kronecker's approximation. Minor thesis, Radcliffe College.

1938 [Wishard, A.] Functions of bounded type. PhD dissertation, Radcliffe College, directed by Lars Valerian Ahlfors. Summary: *Radcliffe College. Graduate School of Arts and Sciences. Summaries of theses accepted in partial fulfilment of the requirements for the degree of doctor of philosophy, 1935–1938*: 172–75.

Publications:

1942 [Wishard, A.] Functions of bounded type. *Duke Math. J.* 9:663–76. Based on PhD dissertation. Reviews: *MR* 5,115c (H. S. Wall); *Zbl* 060.22005 (V. Paatero). Presented as "Some conditions on functions of bounded type" to the AMS, Indianapolis, IN, 30 Dec 1937; abstract: *Bull. Amer. Math. Soc.* 44 (1, pt. 1): 53 #89.

1944 A Phragmen Lindelöf theorem. *Amer. J. Math.* 66:405–10. Reviews: *MR* 6,61b, errata 6:334, (E. F. Beckenbach); *Zbl* 060.22104 (V. Paatero).

References to: AmMSc 7.

"Audrey Wishard McMillan." (Obituary) *Ellsworth* (*ME*) *American*, 17 Jan 2008.

Other sources: Authors' questionnaire 1997; Vassar College Archives; WhoAm 40 (McMillan, Brockway); US census 1910 MN, 1930 CA.

Last modified: December 12, 2008.

MEARS, Florence M. May 18, 1896–December 3, 1995.
Goucher College (BA 1917), Cornell University (MA 1924, PhD 1927).

Florence Marie Mears was born in Baltimore, Maryland, the daughter of Florence Kate (Waidlich) (1867–1966) and Frank G. Mears (b. 1863), both natives of Pennsylvania. Her mother attended college for one year, while her father had a high school education; they married in 1895. Her father was manager of a farm implements store. Her twin brother, John W. Mears (1896–1988), was her only sibling. His obituary notes that he was a retired railroad engineer, a WWI Navy veteran, and retired from Aberdeen Proving Ground in Maryland.

The Mears family lived in Baltimore while Florence Mears was growing up, and it is likely that she attended elementary and high school in that city. She graduated as a mathematics major from Goucher College in 1917. A letter of recommendation written several years later indicates that she had assisted in the physical and chemical laboratories at Eastern High School in Baltimore for five years, presumably just after her graduation from Goucher.

Mears began her formal graduate studies during the summer of 1922, when she studied invariants and covariants at the Johns Hopkins University. The following summer she was at Cornell University, where she enrolled in a course in education and courses in advanced calculus and advanced analytic geometry. She remained at Cornell during the academic year 1923–24, taking four mathematics courses a semester and earning her masters degree in June 1924.

Mears returned to Cornell in 1925 and received her doctorate in June 1927. She held one of three graduate scholarships in mathematics 1925–26 and a fellowship her last year. In addition to her work in analysis and geometry, she also took courses, and minored, in physics. After receiving her PhD, Mears served for one year as head of the department at Alabama College, then a women's college and now the coeducational University of Montevallo. She served as acting assistant professor at Pennsylvania State College the following year, 1928–29.

In 1929 Mears began her career at George Washington University in Washington, D.C., as an assistant professor. In 1930 she was living with her widowed mother in nearby Bethesda, Maryland, where she continued to reside. She was promoted to associate professor in 1936 and to professor in 1944. She continued her work in the general area of her dissertation, the summability of divergent series. The most frequently cited of her results appeared in 1937 in the *Annals of Mathematics*, soon after her promotion to associate professor; this article continued to be cited for more than fifty years. Her last two research papers appeared after her promotion to professor. Mears directed nine master's theses between 1949 and 1964 and two doctoral dissertations at George Washington. Her first doctoral student, Joseph Blum, received his degree in 1958, when Mears was sixty-two, and her second, Janos Edvard Hanson, two years later. George Washington had awarded only four doctorates in mathematics prior to these: two in the 1930s and two in the early 1950s.

In 1939 Mears was elected president of the George Washington University Faculty Club; she was the first woman elected to that office. The following year she served as an officer of the local chapter of Phi Beta Kappa. She was active in the Maryland-District of Columbia-Virginia Section of the MAA; she served as secretary of the

section 1949–50 and was on the executive committee 1951–52. Mears was also a member of the Washington Academy of Sciences.

Mears retired from George Washington University as professor emeritus in June 1966. At that time the citation from the university president included the following:

> The chairman of her department and the Dean of Columbian College of Arts and Sciences have commended her for her excellence as a teacher, her contributions to research, her vital contributions to the Department of Mathematics, and for the esteem in which her students hold her. In 1955 she received an Alumni Citation for twenty-five years of distinguished service. In 1958 the University of California selected her as one of ten women mathematicians as consultants for a Mathematics Project for the study of creativity. In 1962 she was a member of the Examining Committee for doctoral dissertations in mathematics for the University of Allahabad, India. (George Washington University Archives)

After her retirement from George Washington, Mears was immediately hired by Howard University, also in Washington, D.C., where she taught for another ten years. After her second retirement, at age eighty, Mears remained in Bethesda, Maryland, where "her interests included gardening, knitting, cross-stitching and lace-making" according to an obituary in the *Washington Post*. "She became a master weaver and was a member of the Potomac Craftsmen in Washington and the Twenty Weavers." In the late 1940s she had included "dogs" as one of her hobbies. In 1949 an article in the George Washington University alumni magazine noted her interest in growing roses and in Robin, her Dandie Dinmont terrier.

Florence Mears died at Suburban Hospital in Bethesda of heart disease at age ninety-nine in 1995.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Phi Kappa Phi, Sigma Xi.

Thesis and dissertation:

1924 A special function of one variable. MA thesis, Cornell University, directed by Walter Buckingham Carver. Typescript.

1927 Riesz summability for double series. PhD dissertation, Cornell University, directed by Wallie Abraham Hurwitz. Typescript. Printed version, 1928, reprinted from *Trans. Amer. Math. Soc.* 30:686–709.

Publications:

1928 Riesz summability for double series. *Trans. Amer. Math. Soc.* 30:686–709. Published version of PhD dissertation. Reviews: *JFM* 54.0239.01 (W. Rogosinski); *Rev. semestr. publ. math.* 34, pt. 1: 47 (P. Mulder). Presented by title to the AMS, Madison, WI, 9 Sep 1927; abstract: *Bull. Amer. Math. Soc.* 33:659 #54.

1935 Some multiplication theorems for the Nörlund mean. *Bull. Amer. Math. Soc.* 41:875–80. Reviews: *JFM* 61.1094.02 (V. Garten); *Zbl* 013.26104 (E. Kogbetliantz).

1937 Absolute regularity and the Nörlund mean. *Ann. of Math.* 2nd ser., 38:594–601. Reviews: *JFM* 63.0166.03 (J. Karamata); *Zbl* 017.16201 (E. Kogbetliantz). Presented by title as "Summability for absolutely convergent series" to the AMS, Atlantic City, NJ, 27 Dec 1932; abstract: *Bull. Amer. Math. Soc.* 39:25 #12.

1941 Review of *College Algebra*, by P. R. Rider. *Amer. Math. Monthly* 48:54–55.

1943 The inverse Nörlund mean. *Ann. of Math.* 2nd ser., 44:401–10. Reviews: *MR* 5,64d (T. Fort); *Zbl* 061.12202 (D. Gaier).

1945 Nörlund summability of Cauchy products. *Ann. of Math.* 2nd ser., 46:563–66. Reviews: *MR* 7,153a (R. P. Agnew); *Zbl* 061.12201 (D. Gaier).

1948 Transformations of double sequences. *Amer. J. Math.* 70:804–32. Reviews: *MR* 10,245e (J. D. Hill); *Zbl* 035.15903 (R. Schmidt).
1958 Review of *Mathematical Analysis*, by T. M. Apostol. *Amer. Math. Monthly* 65:463–64.
1961 Review of *Calculus of Functions of One Argument with Analytic Geometry and Differential Equations*, by E. J. Cogan, R. Z. Norman, and G. L. Thompson. *Amer. Math. Monthly* 68:193.

Abstract not listed above:
1952 with S. B. Jackson, E. C. Marth, and V. G. Schult. Proposals for future activities of the section. *Amer. Math. Monthly* 59:509 #5. Presented by Miss Schult to the MAA, Lexington, VA, 26 Apr 1952.

References to: AmMSc 5–8, 9P–11P; AmMWSc 12P–13P; AmWom 1935–40; WhoAmW 1.
"Dr. Mears Heads Club." *Washington Post*, 10 Sep 1939.
Davis, Margaret. "Professors are People." *George Washington University Alumni Review* (Apr 1949): 5.
"Florence M. Mears Mathematics Professor." (Obituary) *Washington Post*, 6 Dec 1995.

Other sources: Owens questionnaires 1937, 1940; Smithsonian questionnaire 1982; Division of Rare and Manuscript Collections, Cornell University Library; communications with George Washington University Archives and with Aberdeen Branch of the Harford County (MD) Public Library; "John W. Mears," (Obituary) *Harford County Aegis*; US Census 1900, 1910, 1920, 1930 MD; SSDI.

Last modified: August 1, 2009.

MERRILL, Helen A. March 30, 1864–May 2, 1949.
Wellesley College (BA 1886), Yale University (PhD 1903).

Helen Abbot Merrill was born in Orange, New Jersey, the fifth of seven children of Emily Dodge (Abbot) (1830–1889) and George Merrill (b. 1827). Both of her parents were born in Massachusetts, her mother in Ipswich and her father in Newburyport; they married in Brooklyn in 1851. Her first American paternal ancestor had arrived from England in 1633. Her father graduated from high school and was in the life insurance business, first in Newburyport and later in New Brunswick, New Jersey. In 1860 he was a merchant, in 1870 a dry goods merchant, and in 1880 a grain merchant. In 1958 he was described as having been an importer, insurance auditor, and inventor. The other children in the family were: Mary Elizabeth (b. 1852), George Francis (1857–1858), Francis Gordon (b. 1859), Emily Dodge (b. 1861), William Pierson (1867–1954), and Robert Dodge (b. 1871). The three sons who survived to adulthood all graduated from theological seminary.

Merrill attended public schools in Newburyport and in New Brunswick. She took the classical course as an undergraduate at Wellesley with her main subjects being mathematics, Greek, Latin, science, and history. At the time she was at Wellesley, at the end of its first decade and start of its second, the mathematics department had a full four-year curriculum, which was considered one of the strongest in the college, and the department head was Helen Schafer, who was soon to become the third president of the college.

Helen Merrill graduated from Wellesley in 1886, the same year as Ellen Pendelton, who was to become a colleague in the mathematics department and Wellesley's sixth president. That same year Winifred Edgerton (Merrill), Wellesley class of 1883, became the first woman in the United States to be granted a PhD in mathematics. After her graduation, Helen Merrill taught at the Classical School for Girls in New York City 1886–89 and at Walnut Lane School in Germantown, Pennsylvania, 1891–93. As a volunteer, she taught mill girls for the Dutch Reformed Church in New Brunswick in the years 1889–91.

Merrill began her long tenure as a faculty member at Wellesley College in 1893. During her first year teaching she also studied mathematics at Wellesley. She was an instructor during the period 1893–1901 except for the year 1896–97, when she was a graduate student at the University of Chicago. Her sister Emily Dodge Merrill attended Wellesley as a special student 1895–97. Helen Merrill was promoted to associate professor in 1901 but had a leave of absence from the college for study at Göttingen and for travel in England and Italy during the year 1901–02 and for study at Yale during the academic year 1902–03. While an associate professor, she was elected an alumna member of Phi Beta Kappa from Wellesley.

In a letter of August 3, 1902, to Professor Andrew Phillips of Yale, whom she had met two years earlier, she wrote, "I expect to come to Yale University this fall for work in Mathematics. There will, I suppose be no formalities necessary for my admission, as I am a member of the Mathematics Department of Wellesley College" (Graduate School of Arts and Sciences, Yale University, Student Records (RU 262), Manuscripts and Archives, Yale University Library). During that year she had courses with James Pierpont in the advanced theory of functions and with E. R. Hedrick and H. E. Hawkes in partial differential equations. Although there appears to be no official record of Merrill's advisor, her name appears on the partial

list of students of James Pierpont in his obituary in the *Bulletin* of the AMS. The committee that examined and approved her thesis and record at Yale and that recommended her for the PhD consisted of P. F. Smith, J. P. Pierpont, and M. B. Porter, with Pierpont signing for Porter who was then at the University of Texas. Merrill's dissertation in analysis concerning solutions of certain types of differential equations extends earlier results of Porter, who had earned a PhD at Harvard in 1897 and had been an instructor at Yale 1899–1902. Merrill received her PhD in 1903, and Porter sponsored the presentation of her dissertation results at the 1903 summer meeting in Cambridge, Massachusetts.

During the rest of her career at Wellesley, Merrill was associate professor 1901–15, professor 1915–31, Lewis Atterbury Stimson professor 1931–32, and professor emeritus 1932–49. She was chairman of the department from 1916 until her retirement in 1932. She had a leave of absence in 1914–15 for the Napier Conference in Edinburgh and for travel in Great Britain, Canada, and the United States; she also attended a summer session at the University of California in 1915. In 1922–23 she had another leave for work in English university libraries and for travel in France and Italy.

While on the faculty at Wellesley, Merrill was engaged in many professional and writing activities. She joined the AMS in October 1903 and was listed in the January 1, 1904, membership list as a life member. She was a particularly active member of the MAA, which she joined as a charter member in 1916 along with six of her Wellesley colleagues. She was an associate editor of the *American Mathematical Monthly* 1916–19, served on the executive council 1917–19, and was vice president in 1920, the year the executive council became the board of trustees. Her publications include a textbook, *A First Course in Higher Algebra*, coauthored with her colleague Clara E. Smith, published in 1917. Merrill also wrote mathematical poetry and songs, some of which appeared in the *Mathematics Teacher*. Her highly acclaimed book, *Mathematical Excursions*, often used as a source for mathematics club presentations, was published in 1933 and was reprinted by Dover Publications in 1958. In 1944, a dozen years after her retirement, she presented to the department "A History of The Department of Mathematics, Wellesley College, from the opening of the College in 1875"; it is currently in the Wellesley archives.

Merrill was also engaged in a number of non-professional activities. In 1914 she reported that she was a member of the College Settlements Association, Consumers' League, National Child Labor Association, and American Society For Judicial Settlement of International Disputes. At that time she was a Presbyterian and indicated that she favored woman suffrage. In the summer of 1917 she taught trigonometry in an aviation camp. She also worked with the College Entrance Examination Board. She was a member of the Religious Education Association and the Massachusetts Civic League.

In 1942 she described herself as a Republican and a member of the Congregational church, formerly a Presbyterian. She also indicated that she enjoyed handiwork, puzzles, and writing. She made four trips to Europe, two for a year each, the last to France, Italy, and England in 1922–23. Her travel included trips to Nova Scotia in 1906; to England, Scotland, and Wales in the summers of 1911 and 1914; to California and the Canadian Rockies in the spring and summer of 1915; and frequent trips to North Carolina. She was also interested in model-making and other handicrafts, and music.

Helen Merrill died in 1949 of carcinoma at age eighty-five in her home in Wellesley. The funeral was held in the Wellesley College chapel, and she was buried in the Green-Wood Cemetery in Brooklyn, New York. She was survived by two brothers, the Rev. Dr. William Pierson Merrill, at that time pastor emeritus of the Brick Presbyterian Church in New York, and the Rev. Robert Dodge Merrill, then of Seneca Falls, New York. A special AMS fund of $650 was established by her estate to "use in the interest of mathematical research"; starting in 1971, the description of the fund changed to one that "is available for the use of the Society at the discretion of the governing bodies" (*Bull. Amer. Math. Soc.* 56:558 and 77:1134).

Organizational affiliations: AMS, MAA (charter member), Deutsch. Math. Verein., AAAS, Phi Beta Kappa.

Dissertation:

1903 On solutions of differential equations which possess an oscillation theorem. PhD dissertation, Yale University, directed by James Pelham Pierpont. Handwritten. Printed version, 1903, New Era Printing Co., Lancaster, PA, reprinted from *Trans. Amer. Math. Soc.* 4:423–33.

Publications:

1903 On solutions of differential equations which possess an oscillation theorem. *Trans. Amer. Math. Soc.* 4:423–33. Errata 5:551. Published version of PhD dissertation. *JFM* 34.0374.03 (G. Wallenberg); *Rev. semestr. publ. math.* 12, pt. 2: 9 (D. Coelingh). Presented as "On a notable class of linear differential equations of the second order" to the AMS, Cambridge, MA, 31 Aug 1903; abstract: *Bull. Amer. Math. Soc.* 10:62 #10.

1914 with C. E. Smith. *Selected Topics in College Algebra.* Norwood, Mass.: Norwood Press.

1917 with C. E. Smith. *A First Course in Higher Algebra.* New York: Macmillan Co. Reviews: *Amer. Math. Monthly* 25:72–74 (M. E. Wells); "College algebras," *Bull. Amer. Math. Soc.* 26:323–29 (E. B. Cowley); *Ed.* 38:354; *Nature* 100:263–64 (G. B. M.); *Sch. Sci. Math.* 17:756 (H. E. Cobb); *Science Progress* 12:684 (P. E. B. Jourdain).

1918 Why students fail in mathematics. *Math. Teacher* 11:45–56.

1926 So let me work: a poem. *Math. Teacher* 19:99.

1932 Three mathematical songs: Conic sections, Sing a song of 6 points, Greek and mathematics. *Math. Teacher* 25: 36–37.

1933 *Mathematical Excursions: Side Trips along Paths Not Generally Traveled in Elementary Courses in Mathematics.* Norwood, Mass.: Norwood Press. Reviews: *Amer. Math. Monthly* 40:602–03 (M. E. Wells); *Math. Teacher* 26:315; *Math. Teacher* 26:499–501 (D. E. Smith); *Sch. Sci. Math.* 33:798–99 (J. M. Kinney). Reprint: 1934. Boston: Bruce Humphries; review: *Math. Gazette* 19:62 (A. Inglis). Reprint: 1957. New York: Dover Publications; review: *Zbl* 080.00105 (R. Sprague).

1936 Some undergraduate memories. *Wellesley Magazine* 20 (5): 52–56.

1942 With M. E. Stark. A mathematical contest. *Amer. Math. Monthly* 49:191–92.

1946 When teaching stops. *Wellesley Magazine* 30 (4): 247.

Abstract not listed above:

1921 Synthetic projective methods of generating cubic and quartic curves. *Amer. Math. Monthly* 28:359 #4. Presented to a meeting of the AMS and the MAA, Wellesley, MA, 6–8 Sep 1921.

References to: AmMSc 3–8, AmWomSc, BiDAmEd, BiDWSci, BioWMath, ConAu 170, DcNAA, NatCAB 42, NotMat, NotSci 2, NotTwCS 1S, NotWoSc, Sc&ItsT 6, WomWWA, WomScSearch.

"Helen A. Merrill of Wellesley, 85." *New York Times*, 3 May 1949.

Young, Mabel M. "Helen Abbot Merrill." *Wellesley Magazine* 16 (Jun 1932): 405–6.

Young, Mabel M., Marion E. Stark, and Helen G. Russell. "Helen A. Merrill." *Wellesley Magazine* 33 (Jul 1949): 353–54.
"Helen Abbot Merrill." *Yale University Obituary Record 1948–1949*, 142.
Henrion, Claudia. "Helen Abbot Merrill." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell 147–51. Westport, CT: Greenwood Press, 1987.

Other sources: Owens questionnaire 1937; Owens Papers; Williams Papers; Manuscripts and Archives, Yale University Library; Wellesley College Archives; Grinstein, "Some 'Forgotten' Women of Mathematics"; Lemuel Abijah Abbott, *Descendants of George Abbott, of Rowley, Mass.*..., Vol. II, L. A. Abbott, 1906; Oystein Ore, "James Pierpont–In Memoriam," *Bull. Amer. Math. Soc.* 45 (1939): 481–86; US census 1860 NJ, 1870 MA, 1880 NJ, 1930 MA.

Last modified: September 23, 2015.

MERRILL, Winifred (Edgerton). September 24, 1862–September 6, 1951. Wellesley College (BA 1883), Columbia College (PhD 1886).

Winifred Haring Edgerton was born in Ripon, Wisconsin, the daughter of Clara (Cooper) and Emmet Edgerton. Both of her parents were born in about 1830, her mother in Vermont and her father in New York State. At the time of the 1860 census, her parents and eight-year-old Eber Edgerton born in New York were living with her mother's parents in Ripon. Both her father and her maternal grandfather were listed as farmers. It appears that a few years after her birth, Winifred's family moved to New York City, where her father was a real estate operator.

Winifred Edgerton received her precollege education from private tutors and graduated from Wellesley in 1883. She received a strong mathematics education at Wellesley. While she was there the mathematics faculty consisted of Helen Schafer and Ellen Hayes, both Oberlin graduates; Eva Chandler, a University of Michigan graduate; and Sophia B. Horr, teacher of mathematics and drawing. The mathematics electives at that time included analytic geometry, differential and integral calculus, analytical mechanics, and mathematical astronomy.

After her graduation, Edgerton moved back to New York City and lived with her parents, who supported her decision to continue her study of mathematics and astronomy at Columbia College, which offered graduate degrees in pure science until the formation of Columbia University in 1896. Although the college had not awarded degrees to women, Edgerton had the backing of Columbia's president, Frederick A. P. Barnard, a strong supporter of the admission of women to Columbia College. She had met Barnard through Melvil Dewey, who had been librarian at Wellesley and had become the head of the library at Columbia.

During 1883 Edgerton did independent work in mathematical astronomy, and in January 1884 she applied to Columbia to pursue her studies in the observatory under the direction of John K. Rees, one of the charter members of the AMS. The Reverend Morgan Dix, rector of Trinity Church, who in 1883 had led the opposition of the Columbia College trustees to a move to coeducation, apparently was convinced that she should be given the opportunity to work in the observatory. Dix kept a diary that included his views on coeducation and Edgerton's admission to Columbia; a transcription of those entries is preserved in the Winifred Edgerton Merrill file in the Columbiana collection. On January 18, 1884, he wrote, "the principal thing [the Committee on the Course and Statutes of Columbia College] did was to admit Miss Winifred H. Edgerton to the observatory. . . ; the case was of an absolutely exceptional nature, and established no precedent for others." Two years later, on February 1, 1886, Dix noted that "I introduced a resolution in favour of allowing Miss Edgerton to present herself for examination for the degree of Doctor of Philosophy, and moved its reference to the Committee on the Collegiate Education of Women." In June he "moved that Winifred Edgerton have the degree of Ph.D., cum laude, which was unanimously agreed to. She fully deserves it."

Edgerton's admission to Columbia was specifically to allow her access to the astronomical instruments and not as a student per se. In a 1933 speech, Virginia C. Gildersleeve, then dean of Barnard College, quoted several passages from minutes of the trustees concerning Edgerton's admission to Columbia and the granting of her degree. The February 4, 1884, minutes of the trustees show that they gave her "access to the Observatory and the use of its instruments, placing her under the

direction of adjunct professor Rees, with the understanding that she will render, from time to time, such assistance in the practical work of the Observatory as may be in her power," and the June 7, 1886, minutes indicate that she had pursued a "course in Practical Astronomy and Pure Mathematics in the Graduate Department" (Winifred Edgerton Merrill file). In 1982 Edgerton's son, Hamilton Merrill, reported that she had told him "that a condition of her admission was to dust the astronomical inst[rument]s and so comport herself as not to disturb the men students."

While working in the observatory, Edgerton also taught at Mrs. Sylvanus Reed's Boarding and Day School for Young Ladies. Caroline Gallop Reed had opened her school in 1864 and by 1878 it had a collegiate department that was incorporated as a college in 1883. In a 1944 interview with Winifred Edgerton Merrill by Columbia University librarian Roger Howson, Howson noted and Merrill confirmed that "there was some talk of taking in Mrs. Reed's school as part of Columbia" (Winifred Edgerton Merrill file). Although this did not happen, with Edgerton as a chaperon the young women from that school were permitted to sit in on lectures at Columbia. Also teaching at Mrs. Reed's school at this time was a future Columbia president, Nicholas Murray Butler.

Edgerton also attended at least one class in geology from Johns S. Newberry, who gave her a microscope to use in her classes at Mrs. Reed's school. Her mathematics instructors were William Guy Peck and J. H. Van Amringe. Although she later reported writing two dissertations, one in mathematics and one in astronomy, her degree was awarded on the basis of a dissertation in mathematics. In his report to the president of Columbia in May 1886, Van Amringe paraphrased the prefatory note to the dissertation by saying that "it exhibits originality of treatment in the plan of unifying the different systems of analytical geometry, . . . , the application of quaternions as a reference system for multiple integrals by means of the equations of transformation, . . . , and the reduction of the equations of transformation to the simple formula, $\rho = rk^t j^s k j^{-s} k^{-t}$" (pp. 79–80).

In 1886 Winifred Edgerton became the first woman to receive a degree from Columbia and the first American woman to receive a PhD in mathematics. Her degree is often listed as being in astronomy although the May 3, 1886, president's annual report to the Columbia College board of trustees shows her dissertation to be as shown below in **1886**. Nonetheless, in 1937, when she was seventy-four years old, Winifred Edgerton Merrill listed her dissertation as "(1) Mathematical Astronomy. (a) Computation of the Orbit, the Comet of '83. Data furnished by Harvard University. (b) Determination of Latitude and Longitude of New York City from Direct Observations. (2) Pure Mathematics. Translation and Relations of Various Systems of Coordinates. Published at Columbia University" (Owens questionnaire). Dean Gildersleeve also referred to the first part of this title when quoting the trustees minutes of January 7, 1884: Edgerton "has pursued for several years a line of study in the pure and applied mathematics, and in mathematical Astronomy, in which she has shown an extraordinary proficiency, concluding with an independent calculation of the orbit of a comet from data furnished by the Observatory at Harvard" (Winifred Edgerton Merrill file). Furthermore, a Columbia University timeline entitled "Women at Columbia" shows that in 1886 "Columbia awards its first degree to a woman, a PhD in astronomy to Wellesley College graduate Winifred Edgerton."

After receiving her PhD, Edgerton remained at Mrs. Reed's school for a year as vice-principal until her marriage on September 1, 1887, to Frederick James Hamilton Merrill (1861–1916). She had been "offered the professorship of mathematics and astronomy [at Wellesley] but declined it in preference for marriage" ("First Alumna Button-Holed Trustees for Degree," *Columbia Alumni News*, 28 Apr 1939). Frederick Merrill was born in New York City, received a bachelor's degree from the Columbia School of Mines in 1885, worked on the New Jersey Geological Survey, and returned to the School of Mines on a fellowship in 1886 while still working on the geological survey. At the time of their marriage, F. J. H. Merrill was an instructor in paleontology and geology at Columbia; he received his PhD in 1890. From 1890 to 1904 he held various positions with the state of New York in Albany, including director of the New York State Museum.

In 1888 Winifred Edgerton Merrill was asked to serve on a small committee to form a separate woman's college to be part of Columbia. Because there were men on the committee and it met in an office in downtown Manhattan, Frederick Merrill disapproved; as a result she resigned from the committee. However, her name appears on the request to Columbia's trustees asking for the establishment of such a woman's college. The resulting school, Barnard College, was founded in 1889, shortly after President Barnard's death. In Howson's 1944 interview, Merrill recounted an instance of disapproval from her husband that occurred while they were living in Albany: "I was asked to be on the school board. Lieutenant-Governor Herrick came in to ask me. My husband did not speak to me for two days. He was born in New York and had these ideas of what was proper for women to do" (Winifred Edgerton Merrill file).

In 1900 Frederick Merrill was New York state geologist. At that time, the family was living in Albany and those enumerated in the household were Frederick and Winifred, three children, a cook, a butler, a chambermaid, and a nurse. Their eldest child, Louise (1888–1982), was born in New Jersey; Hamilton (1890–1982), Winifred (1897–1943), and, later, Edgerton (1901–1960) were born in New York State. In 1904 Frederick Merrill left Albany to become a mining geologist in New York City. In 1907 he moved to Nogales, Arizona, and in 1913 to California. Winifred Edgerton Merrill and her children remained in the New York City area. F. J. H. Merrill died in 1916 in Los Angeles.

While raising her family, Winifred Merrill remained active in educational endeavors. She taught at the Emma Willard School in Troy 1894–95, served as an alumna trustee of Wellesley 1898–1904, was president of the Wellesley Alumnae Association 1889–90, served on the Association of Collegiate Alumnae Committee on Collegiate Administration 1899–1904, and was also a member of Albany's Monday Evening and Thursday Morning clubs.

After her return to the New York City area, Winifred Edgerton Merrill resumed her teaching career as the head of the mathematics department of a girls' school, Highcliff Hall, in Yonkers. In 1906 she founded the Oaksmere School for Girls, a non-sectarian boarding school in Westchester County, New York. In 1910 Winifred Merrill, her four children, and several servants were living in New Rochelle, where she was principal of the school. The school was first in New Rochelle but soon moved to her estate on Long Island Sound in the village of Larchmont, a part of the town of Mamaroneck. Merrill directed the school, which was also known as Mrs. Merrill's School and the Merrill School, for twenty years. She opened a branch

in Paris, Oaksmere Abroad, in 1912 and returned from Europe with her younger daughter, Winifred, in September of that year. Merrill made several trips to Europe again in the early 1920s, usually traveling with her daughter Winifred and once with Winifred and her son Edgerton. A 1922 wedding announcement for her daughter Winifred refers to Edgerton Hall in Mamaroneck as Merrill's country home.

Winifred Merrill was supportive of America's participation in the first international track meet for women, which was held in Paris in August 1922. The Eastern trials were held at Oaksmere, and, according to the *New York Times*, Merrill "agreed to entertain America's team and pay all its expenses while it is in Paris, in addition to donating the use of Oaksmere School and its equipment for the May 13 meet" (April 16, 1922). In 1928 Merrill closed Oaksmere, and on September 26th of that year her appointment as "director of the Three Arts Wing of The Barbizon for students of music, drama, and art" was announced in an advertisement in the *New York Times*. Some sources indicate that she moved from Mamaroneck to the Barbizon Hotel in New York City in 1926 and served as the librarian for that residence hotel for women.

In 1918 Merrill published a brochure, *Musical Autograms*, the origin of which she explained in the preface.

> In my early education I was greatly impressed by a book by Benjamin Peirce, entitled "Ideality in the Physical Science", and it was the influence of this book upon my mentality that some years later led me to choose as the subject of the thesis for my Doctor's degree in Mathematics, at Columbia University "The Unification of the Several Systems of Mathematical Co-ordinates." Consciously and unconsciously throughout a busy life ... I continued this mental search for co-ordinating elements in life-experiences, in art-forms, in the complexities of educational problems, always searching for a better understanding of the nature of things through some underlying unifying principle....
>
> My present invention is founded upon the principle that every line or point in nature or in art or in science is subject to mathematical expression through some one of the many systems of co-ordinates or reference axes, among which I include one which I denominate "Musical Axes." The lines referred to may exist in nature, art or science, or be seen in the imagination, but are subject always to the mathematical law and are thus capable of relative expression. (*Musical Autograms*, iii–iv)

She then produced "melodic outlines" based on the signatures of twenty famous men. These outlines were set to music by Robert Russell Bennett and printed by the music publisher G. Schirmer, for whom Bennett was then a copyist and arranger. Bennett later became famous as an orchestrator of Broadway and movie musicals. He wrote in his autobiography that "it was her hope that a person's signature, written across a musical staff, would furnish a melodic line expressive of that person's character, and possibly his or her mood at the time of signing" (p. 49). Bennett later played the music for Merrill at "a talk on Musical Autograms to an important group in Chicago" (p. 56) and then opened "the short-lived Musical Autograms shop ... on Lexington Avenue" in New York City (p. 58n). Merrill

introduced Bennett to her daughters, and in 1919 he married her eldest daughter, Louise.

In addition to her contributions to the books by Maude Fiero Barnes on Italian art and historic periods noted in the introduction to *Renaissance Vistas* and the editor's note to *Historic Vistas*, Merrill held the copyright on these volumes of essays, some of which had been presented as lectures at Oaksmere during the 1910s.

In 1933, for the fiftieth anniversary of her graduation from Wellesley, her class, together with the Woman's Graduate Club of Columbia University and the Zeta Chapter of Phi Delta Gamma, presented Columbia with a portrait of Winifred Edgerton Merrill. The painting, by Mrs. H. E. Ogden Campbell, bears the inscription "She opened the door," and was first hung in Philosophy Hall but later moved to Low Library. The painting was accepted by her fellow teacher from the 1880s, Columbia president Nicholas Murray Butler.

In addition to her involvement with the Wellesley Alumnae Association and board of trustees, Merrill served as president of the Diocesan Branch of the Woman's Auxiliary of Albany, of the New York Branch of the Intercollegiate Alumnae Association, and of the Barbizon Book and Pen Club. She was a member of the Women's Graduate Club of Columbia University, the Women's University Club, the Woman's Club of Larchmont, the Classical and Wellesley clubs of New York City, the Zeta Chapter of Phi Delta Gamma, and, while at Wellesley, Zeta Alpha. She held a life membership in the AAAS. A 1939 article in the *Columbia Alumni News* noted that "she has four children and five grandchildren, resides at The Barbizon, is a vehement supporter of President Roosevelt among a family of Republicans and was active in the campaign to repeal the eighteenth amendment, speaking from soapboxes throughout the city."

For the last two years of her life, Merrill lived with her son Hamilton in Fairfield, Connecticut, and died a few weeks before her eighty-ninth birthday in nearby Stratford. Her funeral was held in Trinity (Episcopal) Church in New York, the same church in which she had been married. She was survived by her two sons and a daughter.

Organizational affiliations: AAAS, ACA (now AAUW).

Dissertation:

1886 [Edgerton, W.] Multiple integrals (1) Their geometrical interpretation in Cartesian geometry; in trilinears and triplanars; in tangentials; in quaternions; and in modern geometry. (2) Their analytical interpretation in the theory of equations, using determinants, invariants and covariants as instruments in the investigation. PhD dissertation, Columbia College, directed by John Howard Van Amringe. Handwritten.

Publications:

1899 The endowment fund. *Wellesley Mag.* 8:1–6.

1918 *Musical Autograms: An Album of Twenty Melodic Silhouettes*. New York: G. Schirmer.

1930a Editor's note. In *Historic Vistas*, by Maude Fiero Barnes. New York: William Farquhar Payson.

1930b Introduction. In *Renaissance Vistas*, by Maude Fiero Barnes, v–vii. New York: William Farquhar Payson.

References to: BiDWSci, BioWMath, MacTutor, NatCAB 41, NotMat, NotSci 2, NotTwCS 1S, Sc&ItsT 6.

"Ending life at college: Commencement exercises of Columbia College. Awarding of honors at the Academy of Music–Miss Winifred Edgerton receives a degree." *New York Times*, 10 Jun 1886.

"Married at Trinity." *New York Times*, 2 Sep 1887.
"Columbia to Honor First Woman Student: Portrait of Mrs. Merrill, Who Received Degree in 1886 to Be Hung at University." *New York Times*, 26 Mar 1933.
"Columbia Honors its First Woman Graduate." *New York Times*, 1 Apr 1933.
Meyer, Annie Nathan. *Barnard Beginnings*. Boston, MA: Houghton Mifflin, 1935.
"First Alumna Button-Holed Trustees for Degree; Second Woman Listed as Columbia College Grad." *Columbia Alumni News*, 28 Apr 1939, 8.
"Mrs. Merrill, 88, Columbia Pioneer: First Woman Graduate of the University Dies–Leader in Founding of Barnard." *New York Times*, 7 Sep 1951.
Amidon, Beulah. "Tribute to Mrs. Merrill." *New York Times*, 20 Sep 1951.
Faier, Joan Sari. "Columbia's First Woman Graduate." *Columbia Today*, Winter 1977, 27–29.
Kelly, Susan E. and Sarah A. Rozner. Winifred Edgerton Merrill: "She Opened the Door" *Notices Amer. Math. Soc.* 59 (2012): 504–12.

Related manuscript material: Winifred Edgerton Merrill file, Columbiana collection, Columbia University Archives.

Other sources: Owens questionnaire 1937; Williams Papers; correspondence with Hamilton Merrill, June 1982; Columbia University Archives; "Annual report of the President of Columbia College for the year 1885–86, made to the Board of Trustees May 3, 1886 (New York); Green and LaDuke, "Contributors to American Mathematics"; R. R. Bennett, *"The Broadway Sound": The Autobiography and Selected Essays of Robert Russell Bennett*, ed. G. J. Ferencz, (Rochester, NY: University of Rochester Press, 1999); "Women at Columbia," Columbia250; "Women Athletic Tryouts Arranged," *New York Times*, 16 Apr 1922; Tuttle, Jane P., "They set the mark: United States teammates who competed in the first international track meet for women" [Winifred Edgerton Merrill]; US Census 1850 NY, 1860 WI, 1870, 1880, 1900, 1910 NY.

Last modified: October 6, 2015.

METCALF, Ida M. August 26, 1856–October 24, 1952.
Boston University (PhB 1886), Cornell University (MS 1889, PhD 1893).

Ida Martha Metcalf was born in Texas, the daughter of Martha C. (Williams) and Charles A. Metcalf. Her mother was born in 1823 in Vermont, and her father was born in the early 1820s in Massachusetts. In 1850 Charles and Martha Metcalf were living in Louisiana, where he was a bookkeeper. Ten years later, they and two girls, Helen E., age nine, and Ida M., age three, were living in New Orleans, where Charles was a clerk. In 1952 Pearson Hunt of the Harvard Business School sent the Cornell University alumni office a short account of Ida Metcalf's life in which he reported that she had come to Boston from Texas on a sailboat with her brother and mother soon after her father died. In 1870 Martha Metcalf and two children, thirteen-year-old Ida and nine-year-old Edward C., were living in Needham, Massachusetts, with Martha's father and sisters. Hunt reported that while she was still in her teens, Metcalf taught in small schools in New Hampshire and worked in the fields after school. According to the 1880 census record, Ida Metcalf was then living in Framingham, Massachusetts, and was a student. It appears she was also a third assistant in the Hillside School in Jamaica Plain, Massachusetts, in the late 1870s and early 1880s while in her early to mid-twenties.

Metcalf entered Boston University as a special student in 1883. After being listed by Boston University as a special student for two years, Metcalf was a regular student and received her PhB with the class of 1886. She wrote a thesis, "The Origin and Development of Styles of Architecture."

During the year 1888–89, Metcalf was a graduate student in mathematics at Cornell University. She received her master's degree with a thesis, "The Theory of Illumination by Reflected and Refracted Light." In February 1891, while teaching at the newly opened Bryn Mawr School in Baltimore, she inquired about returning to Cornell to work on a doctorate in mathematics.

Metcalf spent the year 1892–93 at Cornell taking courses in geometry and analysis. At a meeting of the mathematical club in the spring of that year, Metcalf presented a paper on the work of the algebraic geometer Charlotte Scott of Bryn Mawr College. Serving on her doctoral committee were department head James E. Oliver and Lucien Augustus Wait, the other full professor in the department. Although Oliver was chair of Metcalf's committee, she worked closely with George W. Jones. In the preface to his *Drill-Book in Algebra*, Jones thanked her for spending "half a year in giving form to the text and preparing the questions and exercises" (1892, iv). She also took a course in projective geometry, the area of her dissertation, with him. Her doctorate was awarded magna cum laude in 1893.

In September 1897 a list of appointments to the three public high schools in New York City (then Manhattan and the Bronx) showed Ida M. Metcalf of Boston having been appointed a second assistant for history at the Girls' High School. In the 1900 census report Metcalf was listed with her mother and brother in Wellesley, Massachusetts, and was described as a teacher of mathematics; her brother was a carpenter. In June 1900 the following advertisement appeared in the *Atlantic Monthly Advertiser*: "Newton Lower Falls. Study by the Sea. Tutoring during July and August at a beautiful, restful, and inexpensive place on the coast of Maine. Address Ida M. Metcalf, Ph.D., Newton L. Falls, Mass." (p. 20).

In 1902 an article critiquing an aspect of education in the United States appeared with the author identified only as Ida M. Metcalf, Bryn Mawr, Pennsylvania. In the article, "The pampered children of the poor," (*International Journal of Ethics* 13:87–98), the author writes, "The explicit statements in this essay are based on personal experience in high-school teaching in a great city with a very large foreign population, and on the testimony of others engaged in the same work."

Metcalf lived for a time in Newton Lower Falls, Massachusetts. She also worked for a banking house in New York as a securities analyst. In 1909 she had printed a nine-page pamphlet entitled "A demonstration of Fermat's Theorem concerning the equation $x^n + y^n = z^n$." The error in her argument was pointed out in a 1910 review of the pamphlet in *Archiv der Mathematik und Physik*.

In April 1910 Metcalf was living in Brooklyn and was a teacher according to the census. At about that time she passed a competitive examination for a civil service position with the City of New York and left the teaching profession. Some of her later writing describes her pessimistic attitude toward education. In an article that appeared in February 1911 she quoted actual answers to the New York State Regents' tests, uniform examinations given to high school students, in order to document "the degree of confusion, misconception, and inarticulateness that may, and often does, exist in the minds of some of our young people" (*In lighter vein: Humor in the regents' examinations*, 640). The following year she wrote a letter to the editor of the *New York Times* stating that "the real mission of the schools, the development of intellect and character, is not only shirked, but belittled" ("Material aims of schools: Vocational training called a move in the wrong direction," July 17, 1912).

In October 1910 Metcalf was appointed a monitor and in December 1910, at the age of fifty-three, she became a civil service examiner. Pearson Hunt reported that she was the first woman to take such an examination, and was appointed despite her sex because of her performance. In 1912 she became a statistician for the Department of Finance for New York City. She attempted to take the examination for statistician in the Education Department but was not permitted to do so based on her experience "though she had three college degrees, had taught public and private school most of her life and had been statistician in the department of finance over two years" (*Report of an Investigation of the Municipal Civil Service Commission*, 18). She remained in the Department of Finance until her retirement at the end of 1921. In 1930 she was living in Jamestown, Rhode Island. She worked again as a civil service examiner on a per diem basis until 1939, when she was eighty-one years old.

During the time she was living in New York, Metcalf achieved some notoriety when she placed the following advertisement in the *New York Times* of October 17, 1915:

> To teachers and philanthropic workers:
> Free home and liberal education will be given little girl 8 or 9 years old with capacity to become a woman of high type if given opportunities for development, but now lacking such opportunities.

The *Times* carried a story the next day concerning the advertisement. Metcalf took a ward, eight-year-old Theresa Kalab, who was born in Austria. Kalab studied at New York University and Columbia University and at the Grand Central School of Art and the Art Students League before becoming a commercial illustrator and

author. At the time of Metcalf's death, Theresa Kalab was married to Lawrence Smith and living in Santa Fe, New Mexico.

In his 1952 letter, Pearson Hunt noted that "In view of her own hard struggles to find positions commensurate with her ability, Miss Metcalf throughout her life had a very cynical view of higher education for women. Nevertheless, ... Miss Metcalf made a gift [to Cornell] which was earmarked for the assistance of women students." Metcalf also wrote letters to the editor of the *New York Times* indicating her feminist beliefs. On January 25, 1914, the headline read "The rule of brute force" and the letter following it critiqued an article by William T. Sedgwick, a professor of biology at MIT:

> Prof. Sedgwick told us complacently ... that if women persist in claiming the same rights as other citizens men will exert their superior muscular force and reduce them to literal slavery. ... Are we to understand that all the men unable to hold their own against a prizefighter will be forcibly subdued and held in subjugation if they ask for fair play and venture upon economic competition with their stronger fellow beings? Apparently the dictum of science, as expressed by this prophet, is that we are evolving backward toward the ancestor we share with the gorilla.

On October 11, 1922, Metcalf expressed her views on "discrimination in business circles against women of middle age, a condition the existence of which is readily admitted by employers." She wrote

> The thinking women of today of any age are asking for our sex not privilege but "a fair field and no favor," and intelligent employers, if they would bring their business acumen and judgment to bear upon the matter, would ... seek the most competent and conscientious worker quite irrespective of such incidental qualities as age, sex, complexion, political affiliation or religious creed.

By 1931, Metcalf had moved to Jamestown, Rhode Island, where she had spent summers for many years. In 1948 she became ill and moved to a nursing home in Washington, Connecticut, before moving to Fairlawn Nursing Home in Lexington, Massachusetts, where she lived just over a year before her death from arteriosclerosis at age ninety-six. She was buried in the Lincoln Cemetery in Lincoln, Massachusetts.

Thesis and dissertation:

1886 The origin and development of styles of architecture. PhB thesis, Boston University.

1889 The theory of illumination by reflected and refracted light. MS thesis, Cornell University. Handwritten.

1893 Geometric duality in space. PhD dissertation, Cornell University, directed by James Edward Oliver. Printed by E. D. Norton, Ithaca, NY.

Publications:

1909 *A Demonstration of Fermat's Theorem Concerning the Equation* $x^n + y^n = z^n$. New York: Charles E. Merrill, 1909. Review (listed under Ida M. Metclaff, PhD): *Archiv der Math. und Phys.* 3rd ser., 16:281 #57 (A. Fleck).

1911 "In lighter vein: Humor in the regents' examinations." *Century Illustrated Monthly Magazine* 8 (1911): 640–42.

References to: BioWMath.

"Wants to Educate Girl." *New York Times*, 18 Oct 1915.

Obituary. *Cornell Alumni News*, Feb 1953.

Other sources: Division of Rare and Manuscript Collections, Cornell University Library; Williams Papers; communication with City of New York Department of Personnel; *Report of an Investigation of the Municipal Civil Service Commission and of the Administration of the Civil Service Law and Rules in the City of New York* (Albany, NY: J. B. Lyon Company, 1915); WhoAmW 1 (Smith, Theresa Kalab); US census 1860 LA, 1870, 1880, 1900 MA, 1910 NY, 1930 RI; Massachusetts death certificate.

Last modified: July 20, 2009.

MILLER, Bessie Irving. November 4, 1884–February 4, 1931.
Woman's College of Baltimore (BA 1907), Johns Hopkins University (PhD 1914).

Bessie Irving Miller was born in Baltimore, Maryland, the only child of Bessie (Knotts) (1864–1914) and Irving Miller (1858–1946), both natives of Maryland, who married in 1882. Her father was a surgeon, and in 1900 the household on St. Paul Street in Baltimore included four boarders, a cook, two house maids, and two trained nurses in addition to the three family members.

Miller attended the Girls Latin School, the preparatory department for the Woman's College of Baltimore (Goucher College after 1910), which she then attended and from which she graduated in 1907. According to Cockey's "Mathematics at Goucher," "mathematics was her second choice of interest, chosen when she realized that poor eyesight would make it impossible for her to become a surgeon . . ." (p. 11). In 1903–07, while Miller was a student at Woman's College of Baltimore, the mathematics department there consisted of William H. Maltbie, who had earned his PhD from Johns Hopkins in 1895, and Clara Latimer Bacon, who had earned an MA from the University of Chicago in 1904.

In 1907–08, the year following her graduation from college, Miller was a graduate student in mathematics and physics at the University of Chicago with a fellowship sponsored by the Woman's College of Baltimore. In October 1908 she entered the Johns Hopkins University as a graduate student in mathematics, astronomy, and classical archaeology. This was just a year after Bacon, her college mathematics instructor, entered Johns Hopkins when the trustees voted to allow women to be admitted to graduate courses without special permission.

In 1911 Miller interrupted her graduate studies to become an instructor of mathematics at Kemper Hall in Kenosha, Wisconsin. Kemper Hall, closed in 1975, was an Episcopal school for girls that had preparatory and collegiate departments when Miller was there. Two years later she returned to Johns Hopkins and finished her doctoral work as a university fellow during the year 1913–14. The notes she took her final year for a course on groups taught by Arthur B. Coble, together with her own writings on elliptic functions, are preserved as the Bessie Irving Miller Papers at Johns Hopkins. Miller passed written exams in mathematics, astronomy, and classical archaeology and art, and wrote her dissertation in algebraic geometry under the direction of Coble, who was an early student of Frank Morley at Johns Hopkins. Miller was one of Coble's first two doctoral students. The letter of May 30, 1914, by Morley and Coble recommending the acceptance of her dissertation notes, "She applies effectively geometrical methods to an analytical problem, and obtains results both novel and interesting. The style is good and gives clear evidence of a well-balanced and mature mind" (Student folders, Ferdinand Hamburger University Archives, Johns Hopkins University). When Miller received her doctorate from Johns Hopkins in 1914, she became the first of ten Goucher graduates to obtain a PhD in mathematics before 1940; seven of these were granted by Johns Hopkins. Bacon had become the first woman to receive a PhD in mathematics from Johns Hopkins in 1911. Miller remained at Johns Hopkins the year after receiving her doctorate and was later described as a research worker that year.

In 1915 Miller became head of the mathematics and physics departments at Rockford College in Illinois, where she was to remain for thirteen years. Rockford

College, originally a female seminary, granted its first degree (baccalaureate) in 1882 and remained a women's college until 1958. Institutional changes in titles and department structures over the years resulted in Miller's later being professor of mathematics and physics and then professor of mathematics. During her tenure at Rockford, her primary department's name was mathematics, then mathematics and physics, and finally mathematics and astronomy. Through all these changes Miller was usually the professor teaching the majority of the mathematics, physics, and astronomy courses. By 1920 she was the most senior faculty member at the college. For the year 1919–20 she was joined by associate professor Jessie M. Jacobs (Offermann), who had just earned her PhD at the University of Illinois. Jacobs was also a student of Arthur B. Coble, who had moved to the University of Illinois in 1918 from Johns Hopkins. Jacobs remained one year at Rockford before moving to the University of Texas as instructor of pure mathematics.

In addition to her regular teaching and administrative duties at Rockford, Miller remained intellectually active in broader areas. She again studied at the University of Chicago during the summer of 1920. During her years at Rockford, she greatly expanded and broadened the course offerings in mathematics and science. She introduced courses in differential equations, history of mathematics, mathematical drawing, statistics, projective geometry, applications of mathematics, philosophy of mathematics, and theory of investments, as well as courses for teachers of mathematics. At Rockford she introduced an elective course that covered a broad range of topics in mathematics and science. Her 1924 book *Romance in Science* was based on lectures developed for this course. Similar talks, with titles "The Fourth Dimension" and "The Einstein Theory" had also been given by Miller at meetings of a student mathematics club that was begun two years after Miller's arrival at Rockford.

While Miller was at Rockford, she was especially active in the MAA. She was a charter member of the MAA and was elected secretary of the Illinois Section in May 1924. The following three years she was secretary-treasurer of the section. In addition to talks she presented at MAA meetings, her interest in mathematics education was evident in her participation in the section meetings, where she was a discussant for talks given in 1919 on the training of mathematics teachers and in 1926 on undergraduate mathematics courses in geometry.

Miller had a leave of absence from Rockford College in the spring term 1927–28. She then took a position as instructor at the University of Illinois in 1928. It is unclear what prompted her move to Illinois after that leave. It is possible that she was encouraged to come by Arthur B. Coble, her dissertation advisor, who had spent 1927–28 back at Johns Hopkins before returning to Illinois. It is likely that Miller had contact with Coble that year since in May 1928 she gave a talk to the Maryland-District of Columbia-Virginia Section of the MAA. At Illinois, she directed the master's thesis of Josephine Chanler and possibly others. She also published another research paper in her field, the first since her earlier work based on her dissertation. In addition to her work in the mathematics department at Illinois, Miller was involved in vocational guidance for women for the Woman's League, a University of Illinois organization for female students.

Miller played violin, attended movies, theater productions, and the symphony (Cockey, 11). She was an Episcopalian. Miller's eyesight became increasingly bad during the 1920s, and she frequently used a scribe for her correspondence.

Bessie Irving Miller died at age forty-six on February 4, 1931, in Burnham Hospital in Champaign as the result of a "strepticoccic [*sic*] infection of the throat and mucous surfaces of head: nose ears etc" (Illinois death certificate). She had become ill a few days earlier, and an operation to open the ear drums was performed on February 3. Before her death she was living with Echo D. Pepper, a colleague at Illinois. Miller was buried in Lorraine Cemetery just outside Baltimore. The Bessie Irving Miller scholarship at Rockford College, first given in 1950, provides the income from $7,000 for a female mathematics major each year.

Organizational affiliations: AMS, MAA (charter member), ASA, AAAS, Phi Beta Kappa, Pi Mu Epsilon.

Dissertation:

1914 A new canonical form of the elliptic integral. PhD dissertation, Johns Hopkins University, directed by Arthur Byron Coble. Printed version, 1916, Press of the New Era Printing Co., Lancaster, PA, reprinted from Trans. Amer. Math. Soc. 17:259–83.

Publications:

1913 The derivation of a syzygy between the Hessian and Jacobian of a binary n-ic. *Johns Hopkins Univ. Circular* 7:56-58. Review: *JFM* 44.0140.01 (W. Fr. Meyer).

1915 A new canonical form of the elliptic integral. *Proc. Natl. Acad. Sci. USA* 1:274–75. Reviews: *JFM* 45.1338.01 (G. Szegö); *Rev. semestr. publ. math.* 24, pt. 1: 6 (D. J. (Korteweg). Presented to the NAS USA, 25 Mar 1915; abstract: *Science* n.s., 41:945. Also presented to the AMS, New York City, 27 Dec 1915; abstract: *Bull. Amer. Math. Soc.* 22:269 #8; review of abstract: *JFM* 46.0601.01 (G. Szegö).

1916 A new canonical form of the elliptic integral. *Trans. Amer. Math. Soc.* 17:259–83. Published version of PhD dissertation. Reviews: *JFM* 46.0601.02 (A. Krazer); *Rev. semestr. publ. math.* 25 pt. 1: 12 (P. Mulder). Presented to the AMS, New York City, 27 Dec 1915; see **1915** above for abstract.

1922 Romance in science: an experimental course offered by a department of mathematics. *Math. Teacher* 15:416-22. Talk with same title presented to a meeting of the MAA, Rockford, IL, 28–29 Apr 1922; abstract: *Amer. Math. Monthly* 29:236 #3.

1924 *Romance in science: lectures from a course called "Browse."* Boston: The Stratford Co. Review: *Amer. Math. Monthly* 33:330–31 (W. A. Granville).

1930 An unusual use of the nodal cubic in the plane. *Amer. Math. Monthly* 37:240–41. Review: *JFM* 56.1210.01 (E. Scholz). Reprint: 1994. In *A Century of Mathematics: Through the Eyes of the Monthly*, ed. J. Ewing, 69–70. Washington, DC: Mathematical Association of America.

1931 Perspectivities between the fundamental p-edra associated with the elliptic norm curve Q_p in S_{p-1} where p is an odd prime. *Amer. J. Math.* 53:139–42. Reviews: *JFM* 57.0762.05 (F. Schaale); *Zbl* 001.02402 (E. Bessel-Hagen).

Abstracts not listed above:

1925a Browse: a course in scientific literature. *Amer. Math. Monthly* 32:154 #10. Presented to the MAA, Washington, DC, 1 Jan 1925.

1925b The next step in a unified mathematics course for freshmen. *Amer. Math. Monthly* 32:329–30 #1. Presented to a meeting of the MAA, Peoria, IL, 8–9 May 1925.

1928 A cubic curve and a reflector. *Amer. Math. Monthly* 35:275 #2. Presented to the MAA, Annapolis, MD, 5 May 1928.

References to: AmMSc 3–4, BiDWSci.

"U. of I. Math Teacher Dies of Infection." *Champaign* (*IL*) *News–Gazette*, 6 Feb 1931.

Related manuscript material:

Bessie Irving Miller Papers, 1913–1914, Ms. 101, Special Collections, Milton S. Eisenhower Library, The Johns Hopkins University.

Other sources: PhD dissertation biographical note 1914; Ferdinand Hamburger University Archives, Johns Hopkins University; communications with Baltimore Public Library, Champaign Public Library, Goucher alumnae office, Lorraine Park Cemetery, and Rockford College Archives; Cockey, "Mathematics at Goucher"; US Census 1880, 1900, 1910 MD, 1920, 1930 IL; Illinois death certificate.

Last modified: March 8, 2009.

MONTAGUE, Harriet F. June 9, 1905–March 19, 1997.
University of Buffalo (BS 1927, MA 1929), Cornell University (PhD 1935).

Harriet Frances Montague, born in Buffalo, New York, was the younger of two children of Alice Barbara (Haffa) (1880–1942) and Laurence Hibbard Montague (1881–1950), both natives of Buffalo. Her mother had a high school education and later was a cashier in retail stores and a homemaker; her father had an elementary and private musical education and was an organist, choirmaster, and composer. Her parents married in about 1902; their first child, Ainslie B. Montague, was born in 1904 and died in 1921.

Harriet Montague attended Lafayette High School in Buffalo before entering the University of Buffalo, where she spent many years as a student, and all of her career as a faculty member. (The University of Buffalo, originally private, was incorporated into the state system in 1962 and has since been the State University of New York at Buffalo.) Montague received her undergraduate degree from the University of Buffalo magna cum laude in 1927 in the Honors Division. She stayed at the university as a graduate assistant in mathematics 1927–29 and received her master's degree in 1929. She was then appointed instructor in the department and apparently continued some graduate work in mathematics while also teaching.

In December 1933 Montague applied for admission to Cornell University for the summer of 1934. She was admitted and studied informally with Virgil Snyder that summer and continued her formal course work in the academic year 1934–35. It was recommended that she be given four terms residence credits for her graduate work at Buffalo. A memo of February 1935 indicates that Montague was admitted to Cornell without financial support because she was unknown to any member of the department. However, reports from her Cornell professors were highly favorable, and she was recommended for a tuition scholarship for spring 1935. Virgil Snyder, her dissertation advisor, wrote that he had all the scholars and fellows in the department in his course and that Miss Montague was as good as any member of the class. Having completed her dissertation in geometry, Montague received her PhD in June 1935 with minors in algebra and logic.

After receiving her doctorate, Montague returned to the University of Buffalo and served there as instructor 1929–39, assistant professor 1939–44, associate professor 1944–47, and professor 1947–73. She was acting chairman of the mathematics department during the first semester 1945–46 and in the academic years 1962–65, and was director of undergraduate studies 1970–73. From 1967 she was also professor of education. She retired as professor emeritus in 1973. In her 1981 Smithsonian questionnaire she mentioned both Harry M. Gehman, her department head at Buffalo 1929–62, and Mabel D. Montgomery, "former student, co-author, friend," as close associates with whom she had had significant mathematical contact.

Montague contributed to the department and university in many ways. During the 1930s and 1940s she was often faculty advisor to the University of Buffalo mathematics club. Her curriculum vitae from 1976 lists mainly her most recent activities. She details her departmental committee memberships for 1972–73 as chairman, Building Committee; chairman, Advisory Committee for Undergraduate Studies; Mathematics–Education Committee; and Ad Hoc Committee on Course Renumbering; she notes that other departmental duties in the past are too numerous to reconstruct. School and faculty positions included coordinator for the mathematics

section of the Western New York Science Forum, former member of the Executive Committees of the College of Arts and Sciences and the Millard Fillmore College (the evening division), and former member of the Student Affairs Committee of the faculty senate. University activities for 1971–73 included serving as a member of the President's Committee on the Recruitment and Promotion of Women Faculty and Staff and serving as treasurer of the Faculty Club.

Montague taught both undergraduate and graduate courses, primarily in algebra, geometry, and mathematics education and was often faculty advisor to the mathematics club. She directed one mathematics PhD dissertation, that of Samuel T. Stern in logic in 1962. She also directed seven dissertations for EdD degrees that were awarded between 1969 and 1972. Already in 1953 her concern with mathematics education was evident when she organized the Inter-School Math Society for gifted high school students in six Buffalo area schools. According to her 1976 vita, "the selected group of students and their teachers met monthly on a voluntary basis to study topics in mathematics not in the normal curriculum. This activity predated the impetus generated by Sputnik to recognize and develop the abilities of gifted students in science and mathematics" (Smithsonian questionnaire 1981). The groups met for several years until the National Science Foundation established programs with similar goals. Montague was director of various NSF summer institutes for secondary teachers from 1957 until 1970. Her 1963 textbook for non-science students, *The Significance of Mathematics*, was coauthored with her colleague Mabel D. Montgomery, who had received a PhD in mathematics from the University of Buffalo in 1953, the second year such a degree was awarded there.

Montague was active in mathematics and mathematics education organizations. She was particularly involved with the Upper New York State Section (now the Seaway Section) of the MAA. She was one of the original founders in 1940, served as vice chairman 1952–53, chairman 1953–54, and governor 1961–64. In addition, she served on the MAA nominating committee for 1965 and was a life member of the association. She was also a member of the International Phenomenological Society and of Pi Lambda Theta, an honor and professional association in education, and was a member of the council, and later historian (1974–79), of the Association of Mathematics Teachers of New York State. She had been a member of the AMS for sixty-seven years at the time of her death. Montague was active in professional activities outside of mathematics, especially in Buffalo chapters of the AAUP and the AAUW. She served as secretary and as president of the local branch of the AAUP and as treasurer of the Buffalo AAUW (1937–39). In 1966 the Buffalo branch of the AAUW presented her with its Achievement Award and gave her a lifetime membership in the organization.

Harriet Montague was an active Presbyterian with an involvement in church activities at the local, regional, and national levels. In the 1960s she was chairman of the department of campus ministry for the Council of Churches. She was a ruling elder of the United Presbyterian Church USA beginning in 1957 and was the first woman to serve as vice-moderator (1963) and moderator (1964) of the Presbytery of Western New York. She was a member of the Board of Directors of Auburn Theological Seminary in New York City for several years beginning in 1969, was on the national Board of Christian Education 1965–72 (vice president 1969–72) of the United Presbyterian Church USA, and was a member of the National Commission for United Ministries in Higher Education 1968–72.

In the late 1930s Montague wrote that she was a member of Theta Chi (a social fraternity) and Cap and Gown, and described herself as a Republican. She mentioned music and sports as hobbies. In 1981 she mentioned watercolor painting, gardening, and volunteer work at the Buffalo Zoo, where she was a docent. Nonprofessional memberships at that time were the Buffalo Zoological Society, where she was since 1975 on the board of directors; the Buffalo Museum of Science; and the Buffalo Historical Society. Other local memberships in 1976 included the YWCA and the Allentown Association, a neighborhood organization.

In 1972 the State University Alumni Association presented Montague with its Distinguished Alumni Award. She was given citations at the 50th anniversary of the College of Arts and Sciences at the University of Buffalo and at the 125th anniversary of the founding of the university. The Harriet F. Montague Award was established at the time of her retirement in 1973. It is presented to an undergraduate mathematics major after the completion of his or her junior year, and is awarded on the basis of intellectual and creative promise in mathematics.

After a long illness, Montague died in 1997 at age ninety-one in her Buffalo home, which she shared with Mabel D. Montgomery, her only listed survivor. A memorial service was held in First Presbyterian Church, Symphony Circle; she is buried in Forest Lawn Cemetery in Buffalo.

Organizational affiliations: AMS, MAA, NCTM, AAUW, AAUP, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1929 A detailed study of the directrices of a linear congruence. MA thesis, University of Buffalo. Typescript.

1935 Certain non-involutorial Cremona transformations of hyperspace. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed abstract, 1936, reprinted from *Bull. Amer. Math. Soc.* 42:727–31.

Publications:

1936a Certain non-involutorial Cremona transformations of hyperspace. *Bull. Amer. Math. Soc.* 42:727–31. Abstract of PhD dissertation. Review: *JFM* 62.0751.03 (E. A. Weiss).

1936b Textbooks, reference books or story books. *Natl. Math. Mag.* 11:152–53.

1938 Envelopes associated with a one-parameter family of straight lines. *Natl. Math. Mag.* 13:73–75. Review: *JFM* 64.1318.02 (M. Zacharias).

1940a Review of *Elementary Theory of Equations*, by W. V. Lovett. *Amer. Math. Monthly* 47:164–65.

1940b Review of *Plane Trigonometry*, by W. T. Stratton and R. D. Daugherty. *Amer. Math. Monthly* 47:102–03.

1940c Review of *Portraits of Famous Philosophers Who Were Also Mathematicians*, by C. J. Keyser. *Amer. Math. Monthly* 47:311-12.

1941 A course on the significance of mathematics. *Amer. Math. Monthly* 48:681–84. Talk with same title presented to the MAA, Ithaca, NY, 3 May 1941; abstract: *Amer. Math. Monthly* 48:513 #2.

1942 Review of *A New System of Reckoning Which Turns at 8*, by E. Swedberg. *Amer. Math. Monthly* 49:114–15.

1943 Review of *Galois Lectures, Addresses Delivered by Jesse Douglas, Philip Franklin, Cassius Jackson Keyser, Leopold Infeld. Scripta Math.* 9:107–09.

1944a The method of infinite descent and the method of mathematical induction. *Philos. Sci.* 11:178–85.

1944b Review of *Analytic Geometry*, by E. E. Smith, M. Salkover, and H. K. Justice. *Amer. Math. Monthly* 51:228–29.
1949 Eccentricity and slope. *Pentagon* 9:27–29. Talk with same title presented to the MAA, Rochester, NY, 10 May 1947; abstract: *Amer. Math. Monthly* 55:199 #3.
1951 Tutorial work in mathematics at the University of Buffalo. *Math. Mag.* 24:207–08. Presented as portion of "The tutorial system at the University of Buffalo" to the MAA, Syracuse, NY, 22 Apr 1950; abstract: *Amer. Math. Monthly* 57:588 #7.
1953 Review of *Geschichte der Mathematik*, by O. Becker and J. E. Hofmann. *Scripta Math.* 19:246–48.
1955 Review of *Mathematics in Western Culture*, by M. Kline. *Philos. & Phenomen. Res.* 15:434–36.
1956 with members of Committee on College Algebra. J. C. Eaves, ed. *College Algebra*. New York: Pitman Publishing Co.
1959 A demonstration class in a National Science Foundation Summer Institute. *Bull. Natl. Assoc. Secondary School Principals* 43:98–100.
1961 with P. M. Henry. The case for a general education course in mathematics. *J. Gen. Ed.* 13:97–112. Talk with same title presented to the MAA, Rochester, NY, 7 May 1960; abstract: *Amer. Math. Monthly* 67:832 #7.
1963 with M. D. Montgomery. *The Significance of Mathematics*. Columbus, OH: Charles E. Merrill Books. Reviews: *Math. Gaz.* 49:328 (A. G. Sillitto); *Math. Mag.* 40:39–41 (J. L. Preston). Prelim. Ed. 1961. "How mathematicians develop a branch of pure mathematics," 119–26, 133–35, excerpted in *Mathematics: People, Problems, Results*, ed. D. M. Campbell and J. C. Higgins, 279–88. Belmont, CA: Wadsworth International, 1984.
1970a Certification of teachers of secondary school mathematics. *NY State Math. Teachers' J.* 20:152–59. Also appears as ERIC Document, Apr 1970, with additional charts.
1970b (Editor) With J. W. Democko. *An Introduction to Matrices*. Buffalo: The State University of New York. Written for high school students by high school students.
1972 The sections. In *The Mathematical Association of America: Its First Fifty Years*, ed. K. O. May (The Mathematical Association of America), 78–103. Telegraphic review: *Amer. Math. Monthly* 80:1157.
1973a Let your students write a book. *Math. Teacher* 66:548–50.
1973b Teachers of mathematics in private secondary schools. *NY State Math. Teachers' J.* 23:40-42.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P–13P, 14–21; AmWom 1935–40; LEduc 5; WhoAm 38; WhoRel 1–2.
"Harriet F. Montague, UB Professor of Math, Church Moderator, Dies at 91." *Buffalo News*, 21 Mar 1997.
"Harriet F. Montague, 91, UB Mathematics Professor." (Obituary) *State University of New York at Buffalo Reporter* 28 (27 Mar 1997).
Cavior, Stephen. "Harriet F. Montague, Founder and Former Governor." (Obituary) *Seaway Current* 21 (Fall 1997): 11.

Other sources: PhD dissertation vita 1935; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1981 (with 1976 vita); Division of Rare and Manuscript Collections, Cornell University Library; Former Members of the Department files, Cornell University Department of Mathematics.

Last modified: July 20, 2009.

MOODY, Ethel I. February 9, 1905–April 11, 1941.
Wells College (BA 1926), Cornell University (MA 1927, PhD 1930).

Ethel Isabel Moody was born in Rushville, New York, the second of two children of Alice Arminda (Stearns) (b. 1866) and Edward L. Moody (b. 1865), both natives of New York State who married in 1889 in Rushville. The family lived in Gorham in Ontario County, New York, about six miles from Rushville. Her father was a farmer, who in 1921 was president of the Ontario County Sheep Growers Co-Operative Association, Inc. In the late 1920s he was town supervisor. Her brother, Robert E. Moody (1897–1992), graduated from Cornell in 1918, the year Ethel Moody entered Rushville High School. He was a teacher and was, after his retirement, the Gorham, New York, town historian.

After her high school graduation in 1922, Moody entered Wells College in Aurora, New York, about fifty-five miles from her home. Letters dating from the fall of 1922 in her brother's papers give an indication of her first few weeks at college. "I see right now where I'm going to flunk everything except math" (Robert Moody Papers, #2473. Division of Rare and Manuscript Collections, Cornell University Library). She writes that she likes everything she is taking except history. She also writes that she likes her mathematics professor, Dr. Hollcroft, who is head of the department, and notes that there are four in her math class with the others being sophomores and juniors. In a later letter she mentions that the other girls got C's on the math quiz and that she got an A. She also says that she will try out for basketball but does not think that she will make the team.

Moody graduated from Wells with high honors in mathematics in 1926. Virgil Synder, who later became her thesis and dissertation advisor at Cornell, wrote a letter of recommendation for Moody on February 19, 1930, to Eugenie Morenus at Sweet Briar College. In it he described how he and another Cornell professor had been invited to conduct the 1926 honors examinations in mathematics at Wells College. "We sent up a series of five three-hour papers, together covering all four years, and after the papers had been written, we read them. Miss Moody, one of the candidates, was awarded High Honors. I met her and invited her to come to Cornell, which she did, the following September" (Sweet Briar College Archives). Moody attended Cornell on a scholarship, wrote a thesis under the direction of Snyder in algebraic geometry, and received her master's degree in 1927.

During the summer of 1927, Professor T. S. Fiske, professor of mathematics at Columbia University and secretary of the College Entrance Examination Board, asked Snyder to recommend an advanced student to assist in the clerical work and statistical study of the Board's ratings. Snyder proposed Moody, who was appointed, and, as he explained in his February 1930 letter of recommendation to Morenus, "after two weeks of routine work she was offered the position of director of this work, in charge of 80 girls." Moody returned to Wells as an instructor for the academic year 1927–28, substituting for Evelyn Carroll (Rusk) who was absent on leave for graduate study at Columbia. During that year Moody taught solid geometry, college algebra, trigonometry, analytic geometry, calculus, and projective geometry.

Moody then returned to Cornell to complete her doctoral work. She was appointed an Erastus Brooks fellow upon her return, and at the end of the first year she was reappointed. Snyder noted in his 1930 letter of recommendation that this

happened despite the fact that "there were several worthy competitors. This is an honor unique in the history of this Department at Cornell University." Her major and first minor subjects throughout her graduate work were algebraic geometry and mathematical analysis, respectively; her second minor for her doctoral work was philosophy. Her 1930 dissertation in algebraic geometry was directed by Virgil Snyder. Snyder's 1930 letter continues, "In geometry she has had thorough courses in Projective Geometry, Advanced analytic geometry of two and of three dimensions, Algebraic curves, Cremona transformations, and the Theory of algebraic surfaces, and of mapping. In every course she had done strictly A grade work. The thesis is on a group of cubic Cremona transformations in space, and is one of the very best that has been written under my direction." Moody was the twenty-first student, and eighth woman, to receive a PhD under Snyder's direction.

Early in 1930 Moody received a letter from Eugenie Morenus, head of the mathematics department at Sweet Briar College, a college for women in Virginia, telling her of an expected vacancy in the fall of 1930. The vacancy was created because Julia Wells Bower, who had been an instructor there since 1927, was leaving to resume graduate work at the University of Chicago. Snyder's letter of recommendation assured Morenus that "with a sympathetic environment," he was "sanguine that Miss Moody [would] develop into an unusually good teacher and investigator of mathematics.... She is ... in vigorous health, of attractive appearance, and pleasing manners, and of a particularly winsome and agreeable personality" (Sweet Briar College Archives). Moody took the position and spent three years as an instructor at Sweet Briar.

In 1933 Moody moved to Pennsylvania State College, again as an instructor. She wrote her mother that "I have so much more sympathy for these kids than I did for the ones at Sweet Briar" (Robert Moody Papers). Moody spent the last eight years of her life as an instructor at Penn State. Publications from this period consist of reviews and a short note in the *Bulletin* of the AMS. She also contributed several solutions to the problems section of the *American Mathematical Monthly*, two which were published. Moody was active at the national level in Sigma Delta Epsilon, a fraternity for graduate women in science, and was treasurer in 1939 and 1940.

In the late 1930s, writing for her entry to *American Women: The Official Who's Who Among the Women of the Nation*, Moody described her religious affiliation as Congregational, noted that she was a member of the American Red Cross, and wrote that her favorite recreation was horseback riding and that she was the author of articles for professional journals. She registered to vote as a Democrat in 1940.

Moody bought an automobile, a 1935 Chevrolet Deluxe Coupe, for $275 in the fall of 1939. New York and Pennsylvania drivers licenses from then indicate that she was five feet four inches tall, weighed about one hundred thirty pounds, and had gray eyes and light brown hair. At age thirty-six, on April 11, 1941, Moody died of a fractured skull "when her automobile left a highway near Rushville and plunged down an embankment" (Obituary). A letter of condolence to her mother from the dean's office in the School of Liberal Arts at Pennsylvania State, notes that, "In my conversation with other College Officials ... I soon learned how much they feel the loss of Ethel.... You can be comforted with the fact that while she was with us, she was truly a teacher and a character which inspired her students

to the higher ideals of life. She not only taught the higher ideals of life but lived them herself" (Robert Moody Papers).

Organizational affiliations: AMS, MAA, AAAS, Sigma Delta Epsilon, AAUW, Sigma Xi, Pi Mu Epsilon, Phi Kappa Phi.

Thesis and dissertation:
1927 Quartic surfaces invariant under a Cremona group of order sixteen. MA thesis, Cornell University, directed by Virgil Snyder. Typescript.
1930 A Cremona group of order thirty-two of cubic transformations in three-dimensional space. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1930, reprinted from *Amer. J. Math.* 53:460–74.

Publications:
1931 A Cremona group of order thirty-two of cubic transformations in three-dimensional space. *Amer. J. Math.* 53:460–74. Published version of PhD dissertation. Reviews: *JFM* 57.0798.02 (F. Schaale); *Zbl* 001.22401 (E. G. Togliatti).
1939 Review of *Trigonometry*, by H. K. Hughes and G. T. Miller. *Amer. Math. Monthly* 46:354–55.
1941 Review of *College Algebra*, by H. T. Davis. *Amer. Math. Monthly* 48:400-401.
1943 Notes on the Bertini involution. *Bull. Amer. Math. Soc.* 49:433–36. Published posthumously. Reviews: *MR* 4,253c (V. Snyder); *Zbl* 061.32705 (M. Zacharias).

References to: AmMSc 5–6; AmWom 1935–40.
"Gorham Girl Again Awarded Fellowship." *Rochester Democrat and Chronicle*, 15 May 1929. (With photograph.)
Obituary. Unidentified newspaper clipping, 12 Apr 1941.

Related manuscript material:
Robert Moody Papers, #2473. Division of Rare and Manuscript Collections, Cornell University Library.

Other sources: Owens questionnaire 1937; Division of Rare and Manuscript Collections, Cornell University Library; New York State Archives; communication with Sweet Briar College Archives; US Census 1900, 1910, 1920, 1930 NY.

Last modified: July 20, 2009.

MOORE, Nina M. (Alderton). August 19, 1890–November 23, 1973.
Mount Holyoke College (BA 1914), Columbia University (MA 1915), University of California (PhD 1921).

Nina May Alderton was the second of two children of Arah Eleanor (Easter) (1852–1940) and Joseph Wilton Alderton (1852–1918) of West Virginia. Her parents married there in 1875. Nina Alderton was born in Berkeley Springs, West Virginia; her sister, Viola (1878–1954), was born in Poughkeepsie, New York. In 1900 the family was living in Washington, D.C., where Joseph Alderton was a real estate agent; shortly thereafter, her father was living in Ohio. Her parents presumably divorced as her father remarried in about 1902 and had two more children.

In April, at the time of the 1910 census, Nina Alderton and her mother were living in South Hadley, Massachusetts, where Nina Alderton would attend Mount Holyoke College. She entered Mount Holyoke in 1910 and completed twenty-four hours in physics and twenty-one in mathematics before graduating in 1914. She did graduate work between February 1914 and August 1915 at Yale University and Columbia University. She took four courses at Yale (Advanced Calculus with E. W. Brown, Differential Equations with P. F. Smith, Higher Algebra with D. Leib, and Differential Geometry with J. Pierpont) and six at Columbia (Modern Theories in Geometry with C. J. Keyser, Projective Geometry with W. B. Fite, Theory of Functions of a Real Variable with J. Maclay, History of Mathematics with D. E. Smith at Teachers College, and courses in Analytical Mechanics with G. B. Pegram and Advanced Laboratory Work in Physics with C. C. Trowbridge). She received her master's degree from Columbia in October 1915 with a thesis on multidimensional geometry.

Alderton was an instructor of mathematics at Mount Hermon School in Massachusetts 1915–18. In 1918, before the end of World War I, she became a laboratory assistant involved with X-ray work at the National Bureau of Standards (NBS) (now National Institute of Standards and Technology) in Washington, D.C., and taught at night in a high school. Her work at NBS led to her inclusion as an author of a talk, presented by title, to the American Physical Society in 1919. Alderton and her mother moved to Berkeley, California, in 1919.

Alderton resumed her graduate studies at the University of California, where she was an assistant in mathematics 1919–21. There she had four courses with D. N. Lehmer (Synthetic Projective Geometry, Research in Hyperspace, Theory of Numbers, and Algebraic Surfaces), two courses with M. W. Haskell (Higher Plane Curves, Theory of Functions of a Complex Variable), and one course each with B. A. Bernstein, (Logic of Mathematics) and J. H. McDonald (Elliptic Functions). Her dissertation was directed by Lehmer, and she received her PhD in 1921 after taking her final examination in April of that year.

In August 1921 Nina M. Alderton went to Mills College, a women's college in nearby Oakland, as instructor of mathematics and physics. She joined the one other mathematics faculty member, Hettie Belle Ege, who had a bachelor's degree from Mills and was dean and professor of mathematics. Alderton was assistant professor 1922–26 and associate professor 1926–34. In 1923 she became chairman of what was normally a two-person department; Emma Whiton (McDonald) was at Mills from fall 1923 to January 1925, when she was replaced by Elsie McFarland (Buck), who stayed until the end of that semester. Alderton had a leave of absence

during the academic year 1932–33, returned that fall, and, according to the Mills College *Bulletin*, resigned effective January 1934; the local AAUP chapter offered her assistance the following month.

In 1927 Alderton was already looking for other positions. In February 1927 she indicated that she was writing a book on hyperspace. In a letter of May 9, 1927, to Miss Florence Purington at Mount Holyoke College, Alderton wrote, "I shall want to stay here until I am able to obtain a more promising position. Educational ideas are becoming too radical for me here" (Mount Holyoke College alumna file). She also indicated that she gave all the graduate courses in mathematics including the master's thesis. That summer of 1927, Alderton was in Europe. She taught at John Brown University in Siloam Springs, Arkansas, during her leave from Mills in 1932–33.

Nina May Alderton married William Harrison Moore on July 16, 1934. Moore was born in 1878 in Oregon and since sometime in the 1920s had lived in California where he was a real estate broker. Nina Moore described herself as a homemaker on the questionnaire she sent to Helen Owens in 1937. She later described her professional activity as assistant in the real estate business in California during the period 1934 to 1939. Her husband died October 1, 1939, and Nina Alderton Moore sought academic employment after his death. From 1940 to 1942 she was a teacher at the Drew School in San Francisco, and the next year she was a professor of mathematics and physics at John Brown University in Arkansas, where she had taught during her 1932–33 leave from Mills. Moore taught at West Liberty State College in West Virginia 1943–45.

In 1945 Moore returned to Washington, D.C., and the National Bureau of Standards, this time as a mathematician. According to a Yale alumni directory, she was still living there in 1968 and held, or had held, an appointive position in government service. Moore had joined AAAS in 1947 and was a member of the physics and the mathematics sections. She was a Baptist.

Nina Alderton Moore moved to Vancouver, British Columbia, Canada, by 1970 and died there in 1973 at age eighty-three.

Organizational affiliations: AMS, MAA, AAAS, Phi Beta Kappa, Pi Mu Epsilon.

Thesis and dissertation:

1915 [Alderton, N.] Digest of volume I of Schoute's 'Mehrdimensionale geometrie'. MA thesis, Columbia University.

1921 [Alderton, N.] Involutory quartic transformations in space of four dimensions. PhD dissertation, University of California, directed by Derrick Norman Lehmer. Typescript. Printed version, 1923, reprinted from *Univ. Calif. Publ. Math.* 1:345–58.

Publication:

1923 [Alderton, N.] Involutory quartic transformations in space of four dimensions. *Univ. Calif. Publ. Math.* 1:345–58. Published version of PhD dissertation. Review: *JFM* 49.0489.01 (W. Fr. Meyer).

Presentation:

With N. E. Dorsey, W. S. Gorton, P. T. Weeks. Study of x-ray protective materials. Presented by title to a meeting of the Amer. Physical Soc., Washington, DC, 25–26 Apr 1919.

References to: AmMSc 4–5, 7–8, 10P–11P.

Other sources: Owens questionnaires 1937, 1940; application for social security number 1940; Mount Holyoke College alumnae files; University of California, Berkeley, Archives; US Census 1900 DC, 1900, 1910 OR, 1910 MA, 1920, 1930 CA.

Last modified: December 14, 2008.

MORENUS, Eugenie M. February 21, 1881–October 15, 1966.
Vassar College (BA 1904, MA 1905), Columbia University (PhD 1922).

Eugenie Maria Morenus was born in Cleveland, New York, the first of two children of Maria Euphemia (Van Blarcorn) (1855–1924) and Eugene Morenus (1854–1929), both natives of New York. In the 1900 census her father was described as manager of a glass works in Cleveland, New York, and later as a manufacturer of thermometers. Her brother, Jeremiah B. (1884–1969), was also born in New York State.

In 1900, when she was nineteen, Morenus was a boarder in East Washington, Pennsylvania, while attending school. After receiving her bachelor's degree from Vassar College in 1904, she remained there on a Coykendall scholarship for the year 1904–05, wrote a thesis in algebraic geometry, and received a master's degree in 1905. From January 1906 until June 1907 Morenus was a teacher of mathematics and Latin at Watertown (New York) High School. She was a substitute in mathematics at Vassar 1907–08 and was a teacher of mathematics at Poughkeepsie High School 1908–09.

In 1909, at the age of twenty-eight, Morenus began her long association with Sweet Briar College, about a dozen miles from Lynchburg, Virginia. This college for women had just begun to offer instruction at the postsecondary level three years before she arrived. She was instructor in mathematics and Latin 1909–16, associate professor of mathematics 1916–18, and then professor of mathematics. She was on leave 1918–19 and returned as head of the department, a position in which she continued until her retirement in 1946. Among those hired by Sweet Briar while Morenus was head of the department were Helen Calkins 1927–28, who was acting head while Morenus was on leave; Julia Wells Bower 1927–30; Ethel Moody 1930–33; and Nancy Cole 1933–43, who served as acting head 1934–35 and 1941–42.

After Morenus went to Sweet Briar she continued her studies at the University of Chicago in the summer of 1912 and at Göttingen in the summer of 1913. She studied at Columbia University in the summers of 1915 and 1916 and held an alumnae fellowship from Vassar for study at Columbia 1918–19. She studied at Columbia again during the summers of 1920 and 1921 and received her PhD from Columbia in 1922. Although she wanted to find a position at an institution that supported research, Morenus returned to Sweet Briar and attempted to continue her work in differential geometry. In May 1923 she passed, cum laude, the first part of the associate examination of the American Society of Actuaries.

Morenus often attended meetings of the AMS, and she attended the International Mathematical Congress in Toronto in 1924 and in Oslo in 1936. She spent the year 1927–28 as an AAUW Anna C. Brackett memorial fellow in Cambridge, England. In the summer of 1930 she did additional work at the University of Chicago. Morenus had leaves in 1934–35, when she took an extensive trip that included India, and in 1941–42, when she spent part of the year in Berkeley, California. She later reported having studied at the University of California.

At Sweet Briar she was known for the excellence of her scholarship and her high standards. She was active within the college, where for many years she was secretary of the faculty and was chairman of the committee on instruction. The Sweet Briar memorial tribute by two colleagues, Gladys Boone and Bertha Wailes, at the college also conveys a sense of her non-scholarly interests.

> One of her earliest outside activities at Sweet Briar was to enroll in a cookery class offered in the domestic science department which then existed. She sang in the choir, was considered an excellent photographer and furnished numerous pictures for the early yearbooks. She was also interested in athletics, and at times is said to have helped President Benedict keep an eye on swimmers in the lake. However, riding was her chief joy, and she and her horse, October, affectionately known as Toby, were familiar sights in the countryside as well as on college campus. She rode almost daily, and on occasion took students on overnight horseback trips to Peaks of Otter, Natural Bridge, into the mountains to Hog Camp, and to other distant places otherwise out-of-bounds to student riders.
>
> Dramatics was another of Gene's loves. She planned and directed faculty plays which were an annual event in those days, starring in a number of them herself, ... During her sojourn in Lynchburg its Little Theatre also benefited from her talents. (Sweet Briar College Archives)

Morenus engaged in a number of professional activities. She was a charter member of the MAA, was a member of the Virginia Academy of Science, and was active in the AAUW. For the latter she served as president of the Sweet Briar branch and as chairman of the education committee of the Virginia division at various times.

During World War I, in response to calls for volunteers to help staff factories, she worked for six weeks one summer at an overall factory in Lynchburg. Her family owned a candle factory in her hometown, which required some attention on her part. It was later sold, and Morenus made bequests to Vassar and to Sweet Briar. In about 1940 Morenus described herself as an Episcopalian and a Republican. She was a member of the Daughters of the American Revolution. She made other trips abroad in addition to her trips to study in Göttingen and Cambridge and her trip during her leave of 1934–35. These included a trip to Europe in summer 1936, a cruise in February 1950, and a European trip in 1955.

After her retirement from Sweet Briar in 1946, Morenus changed her address in AMS membership lists from Sweet Briar to her family home in Cleveland, New York, northeast of Syracuse. She taught at Connecticut College in 1947, and for some time after that she spent her summers in Cleveland and her winters in Lynchburg. Sometime later she moved to Babson Park, Florida. She was in a hospital in Lake Wales, Florida, most of the last three years of her life.

Eugenie Morenus died in 1966 in Lake Wales at age eighty-five. She was cremated, and her ashes were sent back to her home town of Cleveland, New York, where her brother was living. In 1960 the Eugenie M. Morenus Scholarship endowment was established by one of the first five graduates of Sweet Briar in the class of 1910. Proceeds are to benefit a student majoring in mathematics or one of the sciences. Six months before her death, the Southeastern Section of the MAA recognized her as one its remaining eight charter members.

Organizational affiliations: AMS, MAA (charter member), AAAS (fellow), AAUW, AAUP.

Thesis and dissertation:

1905 Some curves connected with a system of similar conics. MA thesis, Vassar College. Typescript.

1922 Geometric properties completely characterizing the set of all the curves of constant pressure in a field of force. PhD dissertation, Columbia University, directed by Edward Kasner. Printed version, 1922, Press of the John C. Winston Co., Philadelphia, PA.

Abstract:

1922 Geometric properties of the system of all the curves of constant pressure in a plane field of force. *Bull. Amer. Math. Soc.* 28:242 #17. Based on PhD dissertation. Presented by title to the AMS, New York City, 25 Feb 1922.

References to: AmMSc 4–8, 9P–10P; AmWom 1935–40.
"Dr. Eugenie Morenus Dies at Florida Home." *Lynchburg Daily Advance*, 19 Oct 1966.

Other sources: PhD dissertation vita 1922; Owens questionnaires 1937, 1940; Maltby, *History of the Fellowships*; Columbia University Archives; Society of Actuaries Library; Vassar College Archives; communication with Sweet Briar College Archives and with Alumnae and Alumni of Vassar College (AAVC); US Census 1880, 1900, 1910, 1920 NY, 1900 PA, 1910 VA.

Last modified: March 8, 2009.

MORRISON, Sister Charles Mary. July 19, 1895–January 15, 1953.
Fordham University (BA 1922, MA 1925), Catholic University of America (PhD 1931).

Rose Mary Morrison was born in Hyde Park, Massachusetts, in 1895, before the community was annexed to Boston. She was the daughter of Mary Etta (Kennedy) (1864–1929) of Rhode Island, and Charles F. Morrison (1862–1924) of Massachusetts. At the time of the 1900 census, she was the youngest of three living children (of four born). An older brother, John, was born in 1889, and a sister, Mary, in 1891. In 1900 and 1910 her father was a grocer. By 1910 there were four living children of five born, with a sister, Catharine, age six. Later information indicated that she had two brothers, James K. and John M., and two sisters, Metta (Mary Etta) and Catharine. In 1920 her father was a clerk for the city of Boston, and her brother John was a lawyer. Rose Mary Morrison received her early education in parochial and public schools of Boston and entered the Congregation of the Sisters of Charity of Nazareth, Kentucky, in September 1916, at age twenty-one.

After making her vows, Sister Charles Mary was a high school teacher at Presentation Academy, Louisville, 1918–21. She was in residence at Fordham University from June 1921 to August 1922, when she received her BA degree. She then taught Latin, Greek, mathematics, and German at Nazareth College, the Louisville women's college opened by the Sisters of Charity in 1920. In 1925 she received an MA from Fordham and returned to Nazareth College to teach mathematics.

From 1928 to 1931 Sister Charles Mary was in residence at the Catholic University of America. She was one of four students who wrote their dissertations in algebraic geometry under the direction of Aubrey E. Landry and received the PhD in 1931. The others were Sister Leonarda Burke, Sister Mary de Lellis Gough, and Sister Mary Felice Vaudreuil. Sister Charles Mary's degree was awarded with minors in philosophy and physics.

In 1931 Sister Charles Mary returned to Nazareth College, where she remained until August 1950. She was joined in the mathematics department there by Sister Mary Charlotte Fowler in 1937. While at Nazareth College, Sister Charles Mary also served as head of the mathematics department, as registrar 1925–42, and as dean after 1942. After her return to Nazareth and until she became dean, Sister Charles Mary attended almost every meeting of the Kentucky Section of the MAA. She presented three papers to the section, all in algebraic geometry. In 1934 she was president of the Kentucky Association of Collegiate Registrars.

In 1950 Sister Charles Mary moved to Massachusetts, where she joined the faculty of Archbishop Williams High School in Braintree and served as archdiocesan superintendent for Community High School. She died suddenly at the Carney Hospital in Boston less than three years later as the result of a myocardial infarction; she was fifty-seven. Her remains were interred in the Nazareth Cemetery in Nazareth, Kentucky. In August 1970 a residence hall at Spalding College, the coeducational successor to Nazareth College that is now Spalding University, was named Morrison Hall in her honor.

Organizational affiliations: MAA, NCTM, Assoc. of Collegiate Registrars.

Dissertation:
1931 The triangles in-and-circumscribed to the biflecnodal rational quartic. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed

for The Catholic University of America, Washington, DC. Review: *JFM* 57.0826.04 (F. Schaale).

Abstracts:
1932 The triangles in-and-circumscribed to the biflecnodal rational quartic. *Amer. Math. Monthly* 39:510–11 #1. Presented to the MAA, Lexington, KY, 14 May 1932. Based on PhD dissertation.
1934 Some geometric and trigonometric proofs of the theorem of Morley. *Amer. Math. Monthly* 41:204 #3. Presented to the MAA, Georgetown, KY, 13 May 1933.
1940 Inversion applied to conics. *Amer. Math. Monthly* 47:596 #2. Presented to the MAA, Lexington, KY, 27 Apr 1940.

Reference to: AmMSc 7.

Other sources: PhD dissertation vita 1931; Owens questionnaire 1937; communication with Sisters of Charity of Nazareth Archives; US Census 1900, 1910, 1920 MA, 1930 DC.

Last modified: December 14, 2008.

MULLIKIN, Anna M. March 7, 1893–August 24, 1975.
Goucher College (BA 1915), University of Pennsylvania (MA 1919, PhD 1922).

Anna Margaret Mullikin was born in Baltimore, Maryland, the youngest of four children of Sophia Ridgely (Battee) (1854–1921) and William Lawrence Mullikin (1846–1915), both natives of Maryland. William Mullikin's occupation was listed as leather hider in 1900, and at that time the household consisted of his wife, his mother-in-law, his sister-in-law, the four children, and a cook. In 1910 William Mullikin's occupation was listed as leather dealer. The Mullikin children were Mary Hester (b. 1884), Richard Nicholas (b. 1888), Caroline Battee (1890–1969), and Anna, who later used the name Anne. All of the Mullikin daughters graduated from Goucher College and became public high school teachers. The son earned a PhD in chemistry and worked in industry.

After graduating from Goucher College in 1915, Mullikin taught in private schools for three years. She was at Science Hill School in Shelbyville, Kentucky, 1915–17 and was an instructor at Mary Baldwin Seminary in Staunton, Virginia, 1917–18. She entered the University of Pennsylvania with a university scholarship in mathematics for 1918–19 and received her master's degree at the end of the academic year. The next year she continued her work at the University of Pennsylvania, and at the same time she taught at the Stevens School in the Germantown neighborhood of Philadelphia.

Mullikin worked in topology with R. L. Moore, who had been at Pennsylvania since 1911. Having done his undergraduate work at the University of Texas, Moore returned to Texas in the fall of 1920. He was clearly interested in having Mullikin at Texas, and in the spring of 1920, during negotiations with the department there, Moore wrote that he hoped Texas would offer her an instructorship. In an earlier letter, he had described her as "one of the best students I ever had" (Lewis, "The Building of the University of Texas Mathematics Faculty," 228). Thus, Mullikin spent the year 1920–21 as instructor at Texas. The following year she returned to study at the University of Pennsylvania and simultaneously taught at the Oak Lane Country Day School. Even though Moore remained at Texas, he was advisor for Mullikin's dissertation culminating in her doctorate from Pennsylvania in 1922.

Mullikin's dissertation was an important work in topology, and her main result was often referred to as "Miss Mullikin's theorem." In a 1924 paper in the Polish journal *Fundamenta Mathematicae*, R. L. Moore noted that "a proposition which is a logical consequence of ... theorems of Janiszewski's has been recently established by Miss Anna M. Mullikin in her Doctor's dissertation, which will appear soon in the Transactions of the American Mathematical Society. This paper had gone to the printers before either Miss Mullikin or I was aware that the proposition had already been proved. Apparently Janiszewski's paper is printed in Polish" (6:190fn). Zygmunt Janiszewski's paper appeared in 1913 and he died in early 1920. Mullikin's paper appeared in 1922, and Moore learned of Janiszewski's results from a 1923 paper by Stefan Straszewicz. By 1928, American mathematicians had begun to call the result the "Janiszewski-Mullikin theorem"; in the many citations to her work that have appeared through at least the 1980s, both names of the theorem appear. Thomas Bartlow and David Zitarelli discuss the mathematics in great detail in "Who Was Miss Mullikin?" in the *American Mathematical Monthly* (forthcoming). In 1988 Mary Ellen Rudin, one of Moore's most well-known students, described

Mullikin's thesis as "fantastic" (Albers, Reid, and Rudin, "An Interview with Mary Ellen Rudin," 123).

After receiving her PhD, Mullikin became a high school teacher. She taught at William Penn High School in Philadelphia the academic year 1922–23 and moved to Germantown High School, also in Philadelphia, in 1923. She was a teacher at Germantown High School and became head of the mathematics department in 1952. She remained there until her retirement in 1959. In 1954 Goucher College honored Mullikin with an alumnae achievement citation. During the late 1950s and early 1960s she coauthored textbooks with Ethel L. Grove, who had been at Cuyahoga Heights High School in Cleveland, and Ewart L. Grove of the University of Alabama.

While at Germantown High School, Mullikin taught a future (1952) R. L. Moore student, Mary-Elizabeth Hamstrom. In 1998 Hamstrom wrote to one of the authors that Mullikin's "interest in me was very important." The two became friends, and Mullikin gave Hamstrom her "first dog as a high school graduation present." Mullikin told her that she had chosen high school teaching because research was harder and the money was not as good. In 1930 Mullikin is listed as a Republican and an Episcopalian. In 1956 she endowed the Julia Morgan Fund at the First United Methodist Church of Germantown. Mullikin and Morgan had become friends when both were studying at the University of Pennsylvania. Julia Morgan became a Methodist medical missionary in China before returning to the United States and subsequently teaching medicine at the University of Pennsylvania in Philadelphia.

Anna Mullikin was residing in Philadelphia at the time of her death at age eighty-two in 1975. She was survived by two nieces and a nephew and was interred in Mt. Olivet Cemetery in Baltimore, Maryland.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Dissertation:

1922 Certain theorems relating to plane connected point sets. PhD dissertation, University of Pennsylvania, directed by Robert Lee Moore. Printed version, 1923, Philadelphia, reprinted from *Trans. Amer. Math. Soc.* 24:144-62.

Publications:

1922 Certain theorems relating to plane connected point sets. *Trans. Amer. Math. Soc.* 24:144-62. Published version of PhD dissertation. Reviews: *JFM* 49.0143.02 (H. Tietze); *Rev. semestr. publ. math.* 31, pt. 2:15 (P. Mulder). Presented by R. L. Moore to the AMS, New York City: as "A countable collection of mutually exclusive closed point sets with connected sum," 25 Oct 1919; by title as "Certain theorems concerning connected set points," 28 Dec 1920; and by title as "A necessary and sufficient condition that the sum of two bounded, closed and connected point sets should disconnect the plane," 26 Feb 1921; abstracts: *Bull. Amer. Math. Soc.* 26:147 #2; 27:248–49 #13; and 27:349 #15.

1956a with E[thel] L. Grove and E[wart] L. Grove. *Algebra and Its Use.* 2 vols. New York: American Book Co. Enl. ed.: 1960. New York: American Book Co. Enl. 2nd ed.: 1963. New York: American Book Co.

1956b with E[thel] L. Grove and E[wart] L. Grove. *Teacher's Manual and Key for Algebra and Its Use.* New York: American Book Co. New York: American Book Co.

1961a with E[thel] L. Grove and E[wart] L. Grove. *Basic Mathematics.* New York: American Book Co.

1961b with E[thel] L. Grove and E[wart] L. Grove. *Teacher's Manual and Key for Basic Mathematics.* New York: American Book Co.

References to: AmMSc 4–6, BioWMath, WhoEast 1930.

"Mullikin, Anna Margaret." (Death notice) *Philadelphia Bulletin*, 25 Aug 1975.

Bartlow, Thomas L. and David E. Zitarelli. "Who was Miss Mullikin?" *Amer. Math. Monthly* 116 (2009): 99–114. Preprint.

Other sources: Owens questionnaire 1940; University of Pennsylvania Archives; communications with Mary-Elizabeth Hamstrom 1998, with Goucher College alumnae office (via Rochelle Adler Effron), and with Free Library of Philadelphia; Cockey, "Mathematics at Goucher"; Lewis, "The Building of the University of Texas Mathematics Faculty, 1883–1938"; D. J. Albers, C. Reid, and M. E. Rudin, "An Interview with Mary Ellen Rudin," *College Math. J.* 19 (1988): 114-37; R. L. Moore, "Concerning the Sum of a Countable Number of Mutually Exclusive Continua in the Plane," *Fund. Math.* 6 (1924): 189–202; S. Straszewicz, "Über eine Verallgemeinerung des jordan'schen Kurvensatzes, *Fund. Math.* 4 (1923): 128–35; D. E. Zitarelli, "The Origin and Early Impact of the Moore Method," *Amer. Math. Monthly* 111 (2004): 465–86; "Julia Morgan Fund Grants"; US Census 1900, 1910 MD, 1930 PA.

Last modified: Janyart 13, 2016.

NEE, Henrietta (Terry). December 30, 1904–June 5, 1981.
Shurtleff College (BS 1926), University of Illinois (MA 1929, PhD 1934).

Henrietta Pearl Terry was born in Virden, Illinois, the seventh of eight surviving children of nine born to Mary Etta (Kirwin) (b. 1867) and Herman R. Terry (b. 1863), both natives of Illinois. According to the census reports of both 1900 and 1910, Herman Terry was a farmer living in central Illinois. By 1920 the family had moved to the Alton area, near the Mississippi River, and no occupation was listed for Herman. Henrietta Terry's siblings were Vincent Kirwin (1890–1970), Carl (b. 1892), Albert (b. 1894), Mabel (b. 1896), Clyde Norton (b. 1897), Russell (b. ca. 1903), and Charles Everly (1908–1992).

Henrietta Terry graduated from Alton Community High School in Alton, Illinois, in 1922 and attended the local Shurtleff College, a Baptist college that closed and was later absorbed by Southern Illinois University at Edwardsville. After she received her bachelor's degree in 1926 with a major in mathematics, she taught for two years in the high school in Patterson, Illinois. She then did a year of graduate work at the University of Illinois, received her master's degree in 1929, and taught at Muscatine Junior College (now Muscatine Community College) in Iowa for the first two years after the college was established.

In 1931 Terry returned to the University of Illinois for further graduate study. Her dissertation in the theory of finite groups was directed by H. R. Brahana, who had come to the department at Illinois immediately after receiving his PhD from Princeton in 1920. Although the abstract of her dissertation was accepted for publication in the *American Journal of Mathematics*, it was transferred to the *Duke Journal of Mathematics* and appeared in the first issue of that journal. After Terry received her doctorate in 1934 with a minor in chemistry, she taught for one year at the American College for Girls in Turkey. Upon her return she was an instructor in mathematics at the University of Illinois High School, Urbana. She was elected to membership in the AMS her first year on the faculty there. She remained at the university high school until she took a leave for war service in 1942. She enlisted in the WAVES (Women Accepted for Volunteer Emergency Service), the Women's Reserve of the US Naval Reserve, did her basic training at Smith College, trained in weather forecasting at the Massachusetts Institute of Technology, and served at the Norfolk Naval Air Station in Virginia, where she was an aerologist stationed in the weather bureau there. She accompanied flight crews and was also trained to fly. She became a lieutenant (jg) and later a full lieutenant before her discharge on December 1, 1945.

On December 22, 1945, Henrietta Terry married Raymond Moore Nee, an engineer. Born in Portsmouth, Virginia, in 1903, Raymond Nee received a bachelor's degree from Lynchburg College, a master's degree from Virginia Polytechnic Institute, and a certificate in electrical engineering from Lowell Institute. He held various positions with American Cyanamid Company in Wayne, New Jersey, and worked as a private consultant after his retirement.

The Nees had a daughter, Rayetta Terry, born in 1948. Late in 1951 they had a house built in Upper Nyack, a village on the Hudson River in southern New York State. Except for the year 1955–56, when they lived in Argentina, they lived in that house until after Henrietta Nee's death. Henrietta Nee, who used the name Terry

Nee, was described by her daughter as athletic; she was interested in horseback riding as a girl and played tennis during her high school years. Later she was active in a number of local community groups. They included AAUW (for which she was president), the League of Women Voters, PTA, the Nyack Garden Club, and the Nyack Morning Music Club. She was also a board trustee of the Nyack Library and was involved with the Nyack Hospital thrift shop. She played piano and enjoyed going to concerts and plays.

Their daughter, Rayetta Nee, graduated as a mathematics major from Bryn Mawr College in 1969, studied mathematics for a year at Oxford University, and was a tax attorney in New York City after studying at the Harvard Law School and receiving an LLM in 1974 from the NYU School of Law.

H. Terry Nee died at age seventy-six in the Nyack Hospital in 1981 after a lengthy illness. She was survived by her husband, her daughter, four brothers, and several nieces and nephews, and was buried at Forest Lawn Cemetery in Norfolk, Virginia. In lieu of flowers, contributions were asked for the Nyack Library, Nyack Hospital, or other charity. The H. Terry Nee Book Fund at Bryn Mawr College was established as a memorial fund by her husband and her daughter. Her husband died in 1990 and her daughter at age fifty-one in 1999.

Organizational affiliations: AMS, AAUW.

Dissertation:
1934 [Terry, H. P.] Abelian subgroups of order p^m of the I-groups of the Abelian groups of order p^n type $1, 1, 1, \ldots$. PhD dissertation, University of Illinois, directed by Henry Roy Brahana. Typescript. Abstract of dissertation, 1935, reprinted from *Duke Math. J.* 1:27–34.

Publication:
[**1935** [Terry, H. P.] Abelian subgroups of order p^m of the I-groups of the abelian groups of order p^n and type $1, 1, 1, \ldots$. *Duke Math. J.* 1:27–34. Abstract of PhD dissertation. Reviews: *JFM* 61.0098.04 (K. Molsen); *Zbl* 011.24903 (W. Magnus). Presented by title as "Abelian subgroups of the I-group of the abelian group of order p^n and type $1, 1, \cdots$" to the AMS, Williamstown, MA, 7 Sep 1934; abstract: *Bull. Amer. Math. Soc.* 40 (9 pt. 1): 662 #290.

References to: AmMSc 7.
"H. Terry Nee, of Upper Nyack." (Obituary) *Rockland County (NY) Journal-News*, 6 June 1981.

Related manuscript materials:
Henrietta Pearl Terry Papers (MSS-173), University Archives & Manuscripts, Jackson Library, The University of North Carolina at Greensboro.
Henrietta Pearl Terry Collection (WV-0197), Women Veterans Historical Collection, Jackson Library, The University of North Carolina at Greensboro.

Other sources: PhD dissertation vita 1935; Owens questionnaires 1937, 1940; telephone conversations with Rayetta Nee, 12 Jul 1998, and with friend, Cleo S. Seelinger, 26 Jul 1998; communications with University of Illinois Alumni Association, with Lynchburg College Archives, and with University of North Carolina at Greensboro Archives; WhoE 11 (Nee, Raymond Moore); Nee, Rayetta, (death notice) *New York Times*, 26 Oct 1999; US Census 1900, 1910, 1920 IL.

Last modified: December 14, 2008.

NELSON, Sara L. January 17, 1903–March 6, 1995.
Georgia State College for Women (BS 1926), Cornell University (MS 1930, PhD 1939).

Sara Louise Nelson was born in Oglethorpe, Georgia, the daughter of Mattie (Trussell) (1872–1910) and John Pendleton Nelson (1856–1932), both natives of Georgia. It was a second marriage for her father, who was described as a dry goods merchant in 1900, but who later was a teacher and then county superintendent of schools for about the last twenty years of his life. She had one brother, Robert (b. 1898) and at least two older half-brothers.

Sara Nelson received her elementary and secondary education in the public schools of Oglethorpe, Georgia. She then attended Georgia State College for Women (now Georgia College and State University), which had been the two-year Georgia Normal and Industrial College until shortly before her entrance in the summer of 1922. Nelson continued her studies there during the regular school year and all summers until June 1926, when she received her bachelor's degree with a major in mathematics and a minor in chemistry. A year earlier she had received a collegiate normal diploma.

For three and a half years Nelson taught mathematics, chemistry, and history in two high schools in Georgia. She attended the summer session at Cornell University in 1929 and then resumed her studies there in February 1930. She continued in the summer of 1930 and received her master's degree in September, having studied mathematics and geology and physical geography.

In fall 1930 Nelson joined the faculty at her alma mater, the Georgia State College for Women, where she was to spend the rest of her career except for leaves for further graduate study. She was an instructor for two years before being promoted to assistant professor.

Nelson again took courses at Cornell during the 1933 summer session and then returned for full-time study in 1937. She had requested and received some financial support from Georgia State College for Women. The president also reassured her of her position when she returned. At Cornell she held a tuition scholarship 1937–38 and an Erastus Brooks fellowship in 1938–39. Although she studied mainly with Virgil Snyder, Snyder retired in 1938, and Robert J. Walker became the chair of her doctoral committee. She received her doctorate in 1939 with a major in geometry, a first minor in algebra, and a second minor in analysis.

When Nelson returned to Georgia State College for Women in 1939, she was promoted to associate professor; in 1942 she was promoted to full professor and became department chair. Nelson was particularly interested in the training of teachers and attended an NSF summer workshop on that subject in 1963. She remained as department chair until her retirement in 1968, a year after the school become coeducational and was renamed Georgia College at Milledgeville. Nelson was also active in the school's alumni association and served as its president from 1943 until 1947 and again from 1978 until 1980. In 1987 the association honored her with The Georgia College Alumni Heritage Award.

Nelson was a member of the Georgia Academy of Science; Phi Kappa Phi, an honor society for excellence in scholarship; and Pi Gamma Mu, an honor society in the social sciences. The pastor of the First United Methodist Church of Milledgeville, where she taught Sunday School for many years, referred to her as "the mother of the Wesley Foundation [Campus Ministry] from its infancy to its maturity" (Funeral meditation by Harold Lawrence, provided by David J. DeVries).

Sara Nelson died in a local Milledgeville hospital at the age of ninety-two in 1995 and was buried in the Oglethorpe Cemetery. She was survived by three nieces. The Sara L. Nelson Fund for Mathematics and Science Education was established at the college.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon.

Thesis and dissertation:
1930 A projection of the normal rational quartic curve of four space. MS thesis, Cornell University, directed by Virgil Snyder. Typescript.
1939 Cremona transformations belonging to a family of cubic curves. PhD dissertation, Cornell University, directed by Virgil Snyder (retired 1938) and Robert John Walker. Typescript with erratum. Abstract: *Cornell University. Abstracts of Theses* for 1939, 211–13.

Publications:
1942 Review of *Intermediate Algebra*, by Neil McArthur and Alexander Keith (London: Methuen and Co., 1942). *Amer. Math. Monthly* 49:328.
1943 Review of *Mathematics in Daily Use*, by W. W. Hart, Cottell Gregory, and Veryl Schult (Boston: D. C. Heath and Co., 1942). *Amer. Math. Monthly* 50:384.

Abstract:
1941 Cremona transformations belonging to a family of cubic curves. *Amer. Math. Monthly* 48:423–24 #9. Presented to a meeting of the MAA, Chapel Hill, NC, 28–29 Mar 1941. Based on PhD dissertation.

References to: AmMSc 7–8, 9P–11P; WhoAmW 1.
"Sara Nelson." (Obituary) *Milledgeville* (*GA*) *Union Recorder*, 6 Mar 1995.

Other sources: PhD dissertation vita 1939. correspondence with David J. DeVries, Georgia College and State University; Division of Rare and Manuscript Collections, Cornell University Library; US Census 1900, 1910, 1920, 1930 GA.

Last modified: July 20, 2009.

NEWSON, Mary (Winston). August 7, 1869–December 5, 1959.
University of Wisconsin (BA 1889), Georg-August-Universität Göttingen (PhD 1897).

Mary Frances Winston was born in Forreston, Illinois, the fourth of eight children of Caroline Eliza (Mumford) (1836–1909), who was born in Pennsylvania, and Thomas Winston (1829–1928), who was born in Wales and immigrated to the United States when he was two years old. Mary Winston's parents married in Illinois in December 1861. Her father was a physician trained in a six-week course at Rush Medical School in Chicago, and her mother, who had taught French, art, and mathematics at various schools in the East and in Illinois, prepared the children for college. Her mother learned geology though a correspondence course with the Field Museum in Chicago and learned Greek on her own in order to teach it to her children. Winston's father, who had served in the Union army as a surgeon during the Civil War, had taken advantage of the government's offer to sell land to former officers and bought about 3000 acres, mostly in Nebraska, some of which he would sell when his income was not sufficient to pay for his children's college tuition. The family lived in Forreston, in northern Illinois, until 1892 when they moved to Chicago.

Winston's older siblings were Edward Mumford (1862–1948), Thomas Winfield (1865–1926), and Ambrose Paré (1867–1959). Her younger siblings were Eugenia (1871–1956), Milton (1873–74), Charles Sumner (1876–1928), and Alice (1878–1943). Edward, the eldest child, graduated from Harvard in 1884, received an LLB degree from Wisconsin in 1888, and became a lawyer who was in business in Chicago. Winfield was a graduate of the US Military Academy at West Point and was in the army at the Presidio in 1893–95, where he guarded the Southern Pacific Railway during the 1894 railroad strikes. He indicated then that he expected to take the bar exam. It appears that he made a career in the military; in 1910 he was an army officer living with has wife and five children in Virginia. Ambrose Paré received a bachelor's degree from Wisconsin in 1887 and studied at Johns Hopkins University and the University of Chicago before earning a PhD in political science in 1900 at Cornell University. He specialized in political economy and was later a professor of economics at the University of Texas in Austin. Eugenia received a BA from Wisconsin in 1890. During most of the 1890s the younger siblings, Eugenia, Charles, and Alice, all lived at home, and all did some studies at the University of Chicago. Charles and Alice earned bachelor's degrees in 1896 and 1898, respectively; and Eugenia and Alice earned master's degrees in 1897 and 1903, respectively. Eugenia was a teacher before her marriage; Charles became an engineer; and Alice taught English at the University of Kansas starting in 1909.

In 1884 Mary Frances Winston, known to her family and friends as May, and her older brother Paré enrolled at the University of Wisconsin in Madison, eighty-five miles from Forreston. She interrupted her studies to teach one year in a country school before returning to Wisconsin and graduating in 1889 with honors in mathematics. During at least her last year at Wisconsin, her younger sister Eugenia was also enrolled there, and both were members of one of the two campus ladies' literary societies. Mary Winston wrote a senior thesis on "Integrating factors of differential equations" and wanted to attend graduate school at Wisconsin. She was denied a fellowship, and so in 1889 she accepted a job teaching mathematics

at Wisconsin Female College in Fox Lake. That year the name of the college was changed to Downer College; in 1895 it took over the campus of Milwaukee College and changed its name to Milwaukee-Downer College. Her first year she applied to the mathematics program at Bryn Mawr College but was turned down for a fellowship, which was given instead to Ruth Gentry. However, when Gentry received a European fellowship from the Association for Collegiate Alumnae (ACA) for the following year, Scott telegraphed Winston to suggest she apply again. This time Winston was successful, and in 1891–92 she was a graduate fellow at Bryn Mawr where she studied with Scott and James Harkness. At the end of her year in Europe, Gentry returned to Bryn Mawr and its fellowship. Despite Scott's urging her to stay, Winston left because she could not afford a year without financial support.

Since her family was moving to Chicago, Winston applied for a fellowship at the newly opened University of Chicago. Although she was awarded only an honorary fellowship that paid her tuition, it was sufficient since she could live with her parents. At Chicago, Winston took courses from E. H. Moore, Oskar Bolza, and Heinrich Maschke. They encouraged her to stay at Chicago but she wanted to study in Germany, and in the spring of 1893, with their recommendations, she applied for the ACA European fellowship. She did not receive the fellowship, but in late August 1893 she met with Felix Klein of Göttingen who was in Chicago as the representative of German mathematics at the International Mathematical Congress held in connection with the World's Columbian Exposition. He encouraged her to come to Göttingen to study, although he could not promise her admission there. Christine Ladd Franklin, who had previously corresponded with Klein about the admission of women to Göttingen, heard of Winston's desire to study in Germany and sent her $500 to help finance her first year there. The following week Winston received an offer to teach at Vassar College, which she turned down.

At the end of September 1893 Mary Frances Winston sailed on the S. S. *Westerland* with Ida Hyde, the biologist who had received the ACA European fellowship. Much of the information about Winston's experiences in Europe comes from letters to her family that were transcribed by her daughter, Caroline Beshers, who gave copies of the transcriptions to one of the authors. The letters and transcriptions are now in the Sophia Smith Collection at Smith College.

By mid-October 1893 Winston had met with Klein, who told her to write a petition for admission and informed her that she could attend lectures while waiting for a response. She also met Grace Chisholm and Margaret Maltby, two women who had also come to Göttingen to try to enroll: Chisholm in mathematics, Maltby in physics. Upon first meeting Chisholm, May Winston wrote to her brother Charley October 17, 1893, "We are to have nearly the same work and I think we will work together a good deal. It is an opportunity which I have never enjoyed before–to work with someone who is my equal–or nearly so–for I do not consider her very much ahead of me." By December of that year Winston had realized that Chisholm's English mathematical education was more extensive than her own and realized that she would not get her degree as quickly as Chisholm would.

By the end of October 1893, Winston, Chisholm, and Maltby were all informed that their petitions had been accepted "ausnahm weise (as an exception)." That same week, Winston attended her first lectures: Klein's on hypergeometric series and Heinrich Weber's on function theory and on theory of algebraic numbers. She also expected to attend both Klein's and Weber's seminaries and expected to stop

attending one of Weber's courses. On December 20, 1893, Winston became the first woman to give a *Vortrag* (read a paper) at the university at Göttingen when she outlined a paper that had appeared in the *Mathematische Annalen*.

Winston remained in Europe, studying at Göttingen and occasionally traveling. She and Chisholm were close friends and "they called one another Julius and Pompey, [presumably] because they had crossed the Rhine to victory" (Caroline Beshers to one of the authors, February 24, 1977). Winston decided against applying for the ACA European fellowship for her second year since she had not done any original research by the time the application was due. Her family supported her during 1894–95. Winston's first original work was done during the summer of 1894 and appeared in the *Mathematische Annalen* in 1895. With that paper she was able to secure the ACA fellowship for 1895–96, her third and final year at Göttingen. Her dissertation, written under Klein's supervision, was completed by the middle of that year, and she passed her examination in July 1896. Winston received her PhD magna cum laude in 1897 after finally finding a publisher for her dissertation in Germany. Chisholm and Maltby had both received their PhD's in 1895, and so Winston was the second woman, and the first American woman, to receive a doctorate in mathematics from Göttingen as an enrolled student; Sofia Kovalevskaya had received a PhD from Göttingen in 1874 but had never attended classes there.

While in Göttingen May Winston was part of an American community that included many students of mathematics. She met and became friends with Annie MacKinnon (Fitch), who was the ACA European fellow for the year 1894–95. Two other mathematicians who had been at Cornell University and were studying at Göttingen during this time were Virgil Snyder, who received his PhD from Göttingen in 1895, and J. H. Tanner. Both returned to Cornell and spent the remainder of their careers there. In March 1897 Tanner wrote to the University of Minnesota that Winston "impressed me as an unusually strong mathematician; I should place her certainly in the first group of half a dozen women mathematicians in this century. Few of our people, whether men or women, have had so good a training as has this young women, added to this she has an especially good mathematical mind. She has thoroughly saturated herself with the spirit of modern ideas in mathematics" (private collection).

Winston returned to the United States in 1896 without a job, but at the beginning of September she found a position for the year 1896–97 teaching at St. Joseph High School in St. Joseph, Missouri. In December 1896 she read a paper at a conference held in Chicago; the conference, which had been called by local members of the AMS, adopted a resolution that resulted in the formation of the Chicago Section of the AMS. In 1897 Winston was appointed professor of mathematics at Kansas State Agricultural College (now Kansas State University) in Manhattan. Soon after her appointment, H. B. Newson of the mathematics department of the University of Kansas wrote a review of her dissertation stating: "This publication by Miss Winston ... is in all respects worthy of that lady's reputation as a mathematician.... Although this work was written before its author became a Kansan, it reflects credit upon the state and the state institution which she represents" (*Kansas Univ. Quart.* 7 (1898): 40).

Winston stayed at Kansas State for three years before resigning in order to marry Henry Byron Newson on July 21, 1900. H. B. Newson was born July 10, 1860, in Mt. Gilead, Ohio, and was educated at Ohio Wesleyan University (which

later conferred an honorary doctorate on him) and at Johns Hopkins University. He also studied in Heidelberg and with Sophus Lie 1887–88 in Leipzig. Newson taught at Central Tennessee College 1884–86 and at Western Normal College in Bushell, Illinois, 1888–90 before going to the University of Kansas in 1890. At the University of Kansas, nepotism regulations prevented Mary Winston Newson from teaching during the year, but she was able to teach during the summers. Also during this period, with David Hilbert's permission, she translated his famous "Mathematical Problems" paper for the *Bulletin* of the AMS.

The Newsons had three children: Caroline (1901–1998), Josephine (1903–1994), and Henry Winston (1909–1978). Her eldest daughter, Caroline Newson Beshers, later reported in a letter to one of the authors that Henry B. Newson "was trying very hard to encourage [May] to be a mathematician. May's mother wrote her urging that she set aside a few hours every day for study, as she herself had done, and she also wrote Henry encouraging him to encourage [May]" (August 3, 1977). In Lawrence, Mary W. Newson became friends with Helen Brewster (Owens), who earned her master's degree in 1901 under the supervision of H. B. Newson. In 1937 Owens organized a luncheon to honor women pioneers in mathematics, and Newson was one of the honored guests.

On the night of February 17, 1910, Henry Byron Newson died in his sleep. Not yet fifty, he had been unable to purchase life insurance because of a bad heart and had taught only nineteen and a half years of the twenty years required in order for his widow to receive payments from his retirement pension. Thus, Mary W. Newson was left with only the income from two houses they rented, an income insufficient to support her and her three children. Although the University of Kansas mathematics department hired three new faculty members that year, including Marion Ballantyne White, they could not have hired Newson because her sister Alice Winston had just accepted a position in the English department. When the 1910 census was enumerated in April, Mary Newson, her three small children, and a sister-in-law were listed together. Mary Newson's recently widowed father, her late mother's sister, her sister Alice, and a housekeeper were also living in Lawrence; the latter were still living there in January 1920. Newson remained in Lawrence for a few years after her husband's death. During that period she and Helen Owens, who had returned from New York to Kansas to work on the 1911–12 suffrage campaign, helped produce a Votes for Women Pageant there.

In 1913 Newson accepted a job as an assistant professor at Washburn College in Topeka, Kansas, close enough so that she could come back to Lawrence to spend weekends with her children, who were at first living at her father's house. In 1915 only the youngest child was enumerated with Mary Newson's father, aunt, and sister in Lawrence. While at Washburn, Newson joined the MAA as a charter member and was one of the fifteen original members of the Kansas Section. She often attended the Kansas Section meetings, leading a discussion on a paper of J. N. Van der Vries one year and presenting a paper of her own another year. She was also active in the Kansas Association of Teachers of Mathematics, serving as its chairman in 1915. She was an assistant professor when she left Washburn College at the end of the 1920–21 academic year.

In 1921 Newson became head of the department of mathematics at Eureka College in Eureka, Illinois. During the spring of 1921 she had been looking actively

for a new position, applying at least to Eureka, the University of Texas, and Montana State. Her son later reported that she was offered a position at Texas, but that it was withdrawn because her brother was a professor of economics there. Her daughter Caroline reported that she wanted to leave Washburn because she was "dissatisfied with her subordinate position under a man with much less knowledge" (letter to author February 24, 1977). In addition, Newson had signed a petition supporting a faculty member, Dr. Kirkpatrick, who had been fired for expressing his political opinions to students. The incident was investigated by the AAUP at the time. All those who signed the petition left Washburn within a few years.

Newson remained at Eureka the rest of her career. She taught courses in both mathematics and astronomy and shared the leadership of a combined mathematics and science division from 1928 until 1934 when she became chairman of that division. She was forced to retire from full-time teaching in 1937 when the college instituted a mandatory retirement policy. She continued teaching part time and remained chair of the division another two years. Newson finally retired from teaching at the end of the 1941–42 academic year.

At Eureka, Newson was active in the Illinois Section of the MAA and was particularly active in the AAUW. She was instrumental in the founding of the local chapter of AAUW and served as chairman of the International Relations Round Table of the Eureka branch of the AAUW from 1928 until 1938. In 1940 Newson was honored by the Women's Centennial Congress as one of one hundred women who held positions that were not open to them a hundred years earlier. Her daughter later reported that "it was characteristic of her that when a reporter called the college no one there knew she had received the invitation. She had declined because the dinner came on the same day as her first classes of that semester" (letter to author February 24, 1977). The local paper, *The Daily Pantograph* in Bloomington, Illinois, quoted her as saying, "The trip is out. In my 33 years of teaching, I've always opened my classes on the first day. Any professor knows that he should introduce his own work himself." Instead the Eureka chapter of the AAUW and the local international relations group, two groups with which Newson was involved from the start, honored her with a dinner in April 1941.

In 1913 the University of Wisconsin elected Newson as an alumni member of Phi Beta Kappa. She was a long-standing member of AAUW, having attended meetings as early as her student days at the University of Chicago when it was still the ACA. She was also a member of the Women's Christian Temperance Union, was raised a Unitarian and kept that affiliation as an adult, and in 1914 reported that she was a political independent.

After her retirement Newson moved to Lake Dalecarlia in Lowell, Indiana, where she had previously spent vacations. In 1956 she moved to a nursing home in Poolesville, Maryland, near where her daughter Caroline Beshers lived. She died at the nursing home at age ninety and was buried in Lawrence, Kansas. In 1977 Caroline Beshers wrote that her "mother was probably the most modest and unassuming person alive" but that she had "had the energy and courage to face up to Kaiser Wilhem II and to win, Magna cum Laude."

After Newson's death her children endowed a Mary Newson lecture series on international relations at Eureka College. In March 2007 Newson was named one of Eureka College's "Matrons of Distinction"; in connection with that honor she was described on the web page for March 3rd as "a champion of academic freedom, of

the centrality of international studies to the liberal arts, and of the belief that one individual can (and must) make a difference, even in spite of overwhelming odds."

Organizational affiliations: AMS, MAA (charter member), AAUW, Phi Beta Kappa.

Dissertation:

1897 [Winston, M. F.] Ueber den Hermite'schen Fall der Lamé'schen Differentialgleichung. PhD dissertation, Georg-August-Universität Göttingen, directed by Felix Klein. Göttingen: Druck der Dieterich'schen Universitäts-Buchdruckerei (W. Fr. Kaestner). Review: *Kansas Univ. Quart.* ser. A, 7 (1898): 39–40 (H. B. Newson).

Publications:

1895 [Winston, M.] Eine Bemerkung zur Theorie der hypergeometrischen Function. *Math. Ann.* 46:159–60. Presented as "Note on the theory of hypergeometric functions" to a conference called by members of the AMS, Chicago, 31 Dec 1896–1 Jan 1897. Reviews: *JFM* 26.0482.01 (A. Krazer); *Rev. semestr. publ. math.* 3, pt. 2: 37 (J. C. Kluyver).

1902 (Translator from the German) Mathematical problems, by D. Hilbert. *Bull. Amer. Math. Soc.* 8:437–79. Reprint: 1976. In *Mathematical Developments Arising from Hilbert Problems* Part 1, ed. Felix E. Browder, 1–34. Providence, RI: American Mathematical Society.

1940 Review of *Thomas Jefferson and Mathematics*, by D. E. Smith. *Natl. Math. Mag.* 14:492.

Abstracts not listed above: :

1920 The bridge between high school and college mathematics. *Amer. Math. Monthly* 27:284 #2. Presented to the MAA, Manhattan, KS, 30 Apr 1920.

1926 What constitutes a good teacher of mathematics? *Amer. Math. Monthly* 33:393–94 #7. Presented to a meeting of the MAA, Decatur, IL, 7–8 May 1926.

1928 The ideals of the teacher of mathematics. *Amer. Math. Monthly* 35:403 #3. Presented to a meeting of the MAA, Charleston, IL, 4–5 May 1928.

References to: AmMSc 1–3, 6–7, 9P; AmWom 1935–40; AmWomSc; BiDWSci; BioWMath; MacTutor; NotWoSc; Poggendorff 4; WomScSearch; WomWWA.

"Gets National Honor Then Keeps it Secret." *Bloomington* (*IL*) *Daily Pantograph*, 28 Jan 1941.

"Eureka Honors Dr. Newson." *Bloomington* (*IL*) *Daily Pantograph*, 22 Apr 1941.

"Mary W. Newsom [*sic*], 90, Cited as Mathematician." *Washington Post*, 6 Dec 1959.

Whitman, Betsey S. "Mary Frances Winston Newson: The First American Woman to Receive a Ph.D. in Mathematics from a European University." *Math. Teacher* 76 (1983): 576–77.

Whitman, Betsey W. "Mary Frances Winston Newson (1869–1959)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 92–94. Westport, CT: Greenwood Press, 1987.

Whitman, Betsey S. "An American Woman in Göttingen." *Math. Intelligencer* 15, no. 1 (1993): 60–62.

Growper, Jane Simurdiak. "Namesake of the Newson Lecture: A Woman among Men." *Echoes from Eureka's Past* (1994): 129–60.

Kansas State University Archives and Manuscripts. "University Archives: Women's Guide: Mary (Winston) Newson (1869-1959)."

Rodriguez, Junius P. "'Matrons of Distinction': Eureka Leadership Series (March 3: Mary Frances Winston Newson)."

Related manuscript material:

Mary Frances Winston Papers. Sophia Smith Collection, Smith College, Northampton, MA. Finding aid.

Thomas Winston Papers, 1845–1915 (bulk 1861–1866). History of Medicine Division, National Library of Medicine, USA. Finding aid.

Other sources: PhD dissertation vita 1897; Owens questionnaire 1937; Owens Papers; Williams Papers; Center for Research Libraries College Catalog Collection; Green and LaDuke, "Contributors to American Mathematics"; Grinstein, "Some 'Forgotten' Women of Mathematics"; Maltby, *History of the Fellowships*; Whitman, "Women in the American Mathematical Society before 1900," pt. 3; Kansas State Census 1905, 1915; US Census 1870, 1880, 1900 IL, 1910, 1920 KS, 1930 IL.

Last modified: January 31, 2016.

NEWTON, Abba V. February 19, 1908–May 5, 1996.
Mount Holyoke College (BA 1929), University of Chicago (MA 1931, PhD 1933).

Abba Verbeck Newton was the younger of two daughters of Sarah C. (Verbeck) (1880–1962) and Samuel Smith Newton (1875–1964). Her father, born in Albany, New York, and her mother, born in Ballston Spa, New York, married in 1905. Abba Newton and her older sister, Katharine Marguerite (1906–1994), were both born in Ballston Spa, where their father worked in the office of the American Hide and Leather Company. Katharine Newton became an elementary school music teacher.

Abba Newton attended Ballston Spa High School 1920–24 and St. Margaret's School in Waterbury, Connecticut, 1924–25 before entering Mount Holyoke College. While there she was in the class choir and was a Sarah Willison scholar before graduating magna cum laude with major subjects mathematics and chemistry in 1929. She taught mathematics at Science Hill School, a girls' preparatory school in Shelbyville, Kentucky, the following year and studied mathematics education at Teachers College, Columbia, in the summer of 1930.

Newton attended the University of Chicago from the fall of 1930 through the summer of 1933, taking off only one quarter, summer 1932, during that time. She held a scholarship during 1932–33. She received her master's degree in 1931, with a thesis directed by Mayme Logsdon, and her doctorate in 1933, with a dissertation directed by E. P. Lane.

Having received her PhD in the midst of the Great Depression, Newton was unemployed until April of 1934 when she began teaching in an instructor's absence at American International College in Springfield, Massachusetts. She remained there as instructor of mathematics and chemistry until 1938. Newton then joined the faculty at Hartwick College in Oneonta, New York, replacing Hazel Schoonmaker (Wilson) as the professor of mathematics after Schoonmaker left to marry in the summer of 1938. Newton remained at Hartwick until 1943, after which she taught two classes in the summer of 1943 at the University of Chicago and held a one-year appointment as assistant professor at Smith College 1943–44 as a substitute for a member of the faculty on leave for war work.

In 1944 Newton accepted an assistant professorship at Vassar College, where she was to remain for the next twenty-nine years. She was promoted to associate professor in 1950 and to professor in 1957. She chaired the department at Vassar 1950–51, 1953–58, and 1966–67, and retired as professor emeritus in 1973. While at Vassar she was a faculty fellow at the Institute Henri Poincaré at the Sorbonne in 1951 and at Duke University in 1966. She was an NSF science faculty fellow at the University of Michigan 1958–59 and a visiting research fellow at Princeton in 1971.

After her retirement, Abba Verbeck continued to live in Poughkeepsie, New York. When she was younger, she had indicated an interest in tennis, rowing, and hiking. Newton was a member of the Adirondack Mountain Club from about 1946 at least through the early 1980s. She served as an alumnae trustee of St. Margaret's School 1965–70 and was a member of the Dutchess County Council on World Affairs. She was an Episcopalian and sang in the choir at Christ Episcopal Church in Poughkeepsie. Newton died at age eighty-eight at Eden Park Nursing Home in Poughkeepsie. She was survived by cousins and was buried in the family plot in the Ballston Spa Cemetery.

Organizational affiliations: AMS, MAA, AAUP, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1931 On tangents common to a surface and its polars. MA thesis, University of Chicago, directed by Mayme Irwin Logsdon. Typescript.

1934 Consecutive covariant configurations at a point of a space curve. PhD dissertation, University of Chicago, directed by Ernest Preston Lane. Private edition, 1934[?], distributed by the University of Chicago Libraries, reprinted from *Trans. Amer. Math. Soc.* 36:44–62.

Publications:

1934 Consecutive covariant configurations at a point of a space curve. *Trans. Amer. Math. Soc.* 36:44–62. Published version of PhD dissertation. Reviews: *JFM* 60.0653.03 (M. Pinl); *Zbl* 008.22401 (V. Hlavatý). Presented to the AMS, Chicago, 22 June 1933; abstract: *Bull. Amer. Math. Soc.* 39:502 #200.

1968 Review of *Evolution of Mathematical Thought*, by H. Meschkowski. *Amer. Math. Monthly* 75:213–14.

References to: AmMSc 7–8, 9P–11P; AmMWSc 12P–13P, 14; WhoAm 38; WhoAmW 5–9.

"Abba V. Newton, Vassar College Professor." (Obituary) *Poughkeepsie Journal*, 8 May 1996.

Other sources: MA thesis vita 1931; PhD dissertation vita 1933; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1982; Mount Holyoke College Archives; Smith College Archives; Vassar College Archives; communication with Hartwick College Archives; US Census 1900, 1910, 1920, 1930 NY, 1930 KY; SSDI.

Last modified: March 26, 2009.

NOBLE, Andrewa. March 28,1908–November 21, 1993.
Pacific University (BA 1929), University of California (MA 1934, PhD 1935).

Andrewa Rebecca Noble was the second of four children of Grace (Marshall) (1878–1922) and Emory James Noble (1880–1959). Her parents were born in the Portland, Oregon, area: her father in Oregon City and her mother in Portland; they married in 1903. Her mother attended high school in Portland and later was a teacher and a housewife. Her father had an LLB degree from the University of Oregon and was an attorney. Andrewa Noble and her siblings were born in Oregon City and all attended college. The eldest, Louise (1906–1995), was a teacher and housewife; John Wesley (1913–1975) was a newspaperman and professional writer; and Inez (1916–1994) was a stenographer and housewife and served in the Women's Army Corps in World War II.

Andrewa Noble attended public elementary school 1913–21 and high school 1921–25 in Oregon City. At graduation she received an honor scholarship to Pacific University in Forest Grove, Oregon. Four years later she graduated from Pacific magna cum laude. While at Pacific, she was involved with the drama club; was a member of the Women's Athletic Association; and played soccer, basketball, and volleyball. She was a member of Alpha Kappa Delta, a local sorority, and worked on the university's yearbook. She was active in the debate club and earned the Witham debate cup her junior year. In her senior year she was the vice president of ASPU, the student association, and was editor of *The Index*, the college newspaper. She served as the permanent secretary of her graduating class of 1929. The year following her graduation she was vice president of the alumni council and was living in Gladstone, Oregon.

In 1930 Noble became a high school teacher in Tosten, Montana, and taught there until 1932. She was a graduate student at the University of California 1933–35. While in Berkeley she earned a master's degree in 1934 and a doctorate in 1935. She studied, among other subjects, logic with A. B. Bernstein, projective differential geometry with Pauline Sperry, and number theory with D. N. Lehmer, who directed her dissertation in that area. She became a life member of the University of California's alumni association.

During 1935–36 Noble was a teacher in Colstrip, Montana, and the following year she was superintendent of schools there. She taught in a high school in the state of Washington 1937–38. In 1940 Noble became an instructor at San Francisco Junior College and stayed in that position until 1945, serving as coordinator of the remedial arithmetic program from 1942. She was appointed instructor at Montana State University (now University of Montana) in Missoula sometime before July 1946 and spent the academic year 1946–47 as an assistant professor there.

In 1947 Noble returned to her alma mater, Pacific University, and was an associate professor and secretary of the faculty for two years. It appears she then lived with her brother in Oakland, California, for some time before joining the faculty at Mills College in 1952. From 1952 until 1957 she was assistant professor of mathematics and physics and head of the department at Mills, a women's college in Oakland. From 1957 to 1959 she was assistant professor at Chico State College before returning to Pacific University, where she was to teach the last eight years of her career. She was associate professor 1959–1961 and professor from 1961 until her retirement in 1965. She also served as chairman of the department at Pacific.

In the 1960s she served as chairman of the chemistry, physics, and mathematics section of the Northwest Scientific Association.

Noble belonged to the Protestant Episcopal Church and maintained a life membership in the Townsend, Montana, Order of the Eastern Star. While in college she served on the Hoover for President Commission. She was a Republican and served as precinct committeewoman in Forest Grove in the 1960s. She served as the official scorer of the Pacific University basketball team 1962–63 and counted stamp collecting among her hobbies.

After her retirement, Noble lived for a number of years in Auburn, California, and in Forest Grove, Oregon, alternating between them every few years, according to combined membership lists of the professional mathematics organizations. In the last half of the 1980s she was living in Forest Grove and in the 1990s in Auburn. She died in Placer County, in which Auburn, California, is located, at age eighty-five in 1993.

Organizational affiliations: AMS, MAA, AAAS, Sigma Xi, Pi Mu Epsilon.

Dissertation:
1935 On the enumeration of uniform squares. PhD dissertation, University of California, directed by Derrick Norman Lehmer. Typewritten.

Publications:
1947 The remedial arithmetic program at the San Francisco Junior College and its implications in the teaching of science. *Northwest Science* 21 (1): 12–13. Presented to the Northwest Scientific Assoc., Spokane, WA, 27 Dec 1946.

Abstract not listed above:
1953 Mathematics in a women's college. *Amer. Math. Monthly* 60:668 #5. Presented to the MAA, Missoula, MT, 19 Jun 1953.

References to: AmMSc 7–8, 9P–11P; AmMWSc 12P.

Other sources: PhD dissertation biographical information 1935; Smithsonian questionnaire 1985; University of California alumni office; communication with Pacific University Archives; US Census 1910, 1920 OR; SSDI.

Last modified: March 8, 2009.

O'BRIEN, Katharine. April 10, 1901–April 10, 1998.
Bates College (BA 1922), Cornell University (MA 1924), Brown University (PhD 1939).

Katharine Elizabeth O'Brien was born in Amesbury, Massachusetts, the younger of two daughters of Catherine (Higgins) (1867–1947) and Martin William O'Brien (1867–1944), both of whom had emigrated from Ireland about a decade before their marriage in 1896. Her sister, Mary Ellen (1897–1974), was also born in Amesbury, where in 1900 Martin O'Brien was a carriage painter. The family moved to Portland, Maine, when Katharine was an infant. In 1910 her father was a painter in a carriage factory; in 1920 he was an auto painter in a repair shop, and her sister was a primary school teacher. For about the last twenty years of his life her father was superintendent of the Songo River [Steamboat] Line when he and his wife lived in Lake Sebago, Maine, in the summers.

Katharine O'Brien was the class valedictorian when she graduated from Deering High School in Portland at age seventeen. She then entered Bates College in nearby Lewiston, Maine, and graduated from Bates in 1922 with double honors in mathematics and science and with a minor each in the language and philosophy groups.

O'Brien's interests throughout her life focused on three areas: mathematics, music, and poetry. In 1922–23, the year after her college graduation, she played piano as an assistant in the department of hygiene and physical education at Smith College. She also took a graduate course in music and one in English that year. When O'Brien applied for admission to Cornell in May 1923, she asked about possible assistantships in English or music. We do not know the outcome of that request, but in 1923–24, she did graduate work in mathematics there and earned a master's degree in 1924 with a major in geometry and a minor in analysis, although she had requested a minor in English.

From January to June 1925 O'Brien taught at Jordan High School in Lewiston, Maine, and from 1925 until 1936 at the College of New Rochelle, a Catholic college for women in New Rochelle, New York, that now admits men to schools other than the original school of arts and sciences. At New Rochelle, O'Brien was instructor 1925–29 and professor and department head 1929–36. She was also a scholarship participant in a master class in piano with Sigismond Stojowski in New York City in 1934–35.

In 1936 O'Brien returned to graduate studies in mathematics at Brown University, where in 1937–38 she was a University scholar. She received her PhD in 1939 with a dissertation in analysis.

O'Brien joined the mathematics faculty of Deering High School in Portland, Maine, in 1940. The first five years there she was also director of the Girls' Glee Club. She became head of the mathematics department in 1945 and remained head until her retirement in 1971. Although she seems to have been an extremely successful teacher, it appears she sought other positions at least in the 1940s. In a letter to R. G. D. Richardson of Brown on October 9, 1948, she wrote, "It seems strange that there has been no teaching position for me in a New England college in the nine years since I received the degree at Brown" (Correspondence 1947–1949, R. G. D. Richardson Papers, Brown University Archives).

In 1962 O'Brien became a lecturer at Gorham State Teachers College (now the University of Southern Maine). She continued lecturing there until 1973; during that time the name of the college changed to Gorham State College, then Gorham State College of the University of Maine, and, in 1970, to the University of Maine at Portland-Gorham. She was also a lecturer in NSF institutes for teachers at Brown in summers 1962–65 and 1967.

O'Brien's many professional and extracurricular activities included serving as the Maine representative to NCTM 1951–56, refereeing for the NCTM journal *Mathematics Teacher* for more than thirty years (1953–84), and participating in activities of the NCTM affiliate, the Association of Teachers of Mathematics in New England (ATMNE). During the 1950s she gave talks to both of these groups and served on a panel, "The Gifted Student," at a meeting of the National Education Association. During the summer of 1951 she helped to run an ATMNE-sponsored institute for teachers of mathematics at Connecticut College. She was governor for the northeastern region of the United States of Mu Alpha Theta, the high school and junior college mathematics club, 1962–65, and was a member of the New York Academy of Sciences. O'Brien published poetry and light verse in magazines and newspapers, including the *Saturday Review*, *Christian Science Monitor*, *New York Herald Tribune*, *New York Times*, *Ladies Home Journal*, and *Scientific Monthly*. She also wrote mathematical poems, many of which appeared in professional journals; portions of two of those poems, **1968** and **1982a**, were reprinted in a dictionary of mathematical quotations. In 2008 two poems, "Undefined Terms" and "Valentine," from O'Brien's collection **1967** were reprinted in the anthology *Strange Attractors: Poems of Love and Mathematics* (Natick, MA: A. K. Peters). She was a member of the International Platform Association, dedicated to public speaking and performing, and the Poetry Society of America. She also composed music and published choral octavos using the words of Thomas Hardy. Finally, she was a member of Bates Key, the Portland College Club, and the Society of Bowdoin Women.

O'Brien was recognized in a number of ways for her contributions to mathematics, poetry, and music. In 1960 the University of Maine awarded her an honorary Doctor of Science in Education degree, and in 1965 Bowdoin College gave her an honorary Doctor of Humane Letters degree. The Dr. Katharine E. O'Brien mathematics award to be given annually to a senior at Deering High School was established by the Deering class of 1964. In 1985 Westbrook College, which later merged with the University of New England, gave O'Brien the Deborah Morton Award, an annual award in Maine honoring women's achievement.

Katharine O'Brien died on her ninety-seventh birthday at a nursing home in Falmouth, Maine, after a lengthy illness. A funeral Mass was celebrated at St. Joseph's Church, and she was buried in St. Joseph's Cemetery in Amesbury, Massachusetts. After her death, the University of Maine System received a gift of $400,000 from her estate in support of its library holdings. In particular, each of the seven universities in the system was to create one or two specialized named library collections. While almost all of the schools choose to honor O'Brien with poetry collections, other areas covered are literature, women's and ethnic studies, mathematics, computer science, environmental studies, forestry, nursing, secondary education, and children's literature. A bequest of a comparable size was made to Bowdoin College, a portion of which was earmarked for the library. Her papers, including photographs, are housed in the Maine Women Writers Collection, University of New England Libraries.

Organizational affiliations: MAA, NCTM, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1924 A study of methods of proof of Descartes' rule of signs and the Budan-Fourier theorem. MA thesis, Cornell University. Typescript.

1939 Some problems in interpolation by characteristic functions of linear differential systems of the fourth order. PhD dissertation, Brown University, directed by Jacob David Tamarkin. Typescript. Abbreviated form, 1940, reprinted from *Bull. Amer. Math. Soc.* 46:281–90.

Publications (excluding poetry, music, and other short pieces):

1940 Some problems in interpolation by characteristic functions of linear differential systems of the fourth order. *Bull. Amer. Math. Soc.* 46:281–90. Abbreviated form of PhD dissertation. Reviews: *JFM* 66.0420.01 (E. Kamke); *MR* (I. J. Schoenberg) 1,334c; *Zbl* (F. Schoblik) 024.31505.

1952a Review of *Anthology in Education*, by L. W. Harding. *Math. Teacher* 45:302.

1952b Review of *Second Algebra*, 2nd ed., by V. S. Mallory and K. C. Skeen. *Math. Teacher* 45:618–19.

1953 Review of *Calculus*, by T. Fort. *Math. Teacher* 46:219.

1955a (Editor) *Successful Devices in Teaching Algebra*. Portland, ME: J. Weston Walch.

1955b (Editor) *Successful Devices in Teaching Geometry*. Portland, ME: J. Weston Walch.

1956 Problem solving. *Math. Teacher* 49:79–86. Talk with same title presented to Assoc. Teachers Math. New England, Boston, 4 Dec 1954.

1966 *Sequences*. Houghton Mifflin Mathematics Enrichment Series. Boston: Houghton Mifflin. Telegraphic review: *Amer. Math. Monthly* 75:1144.

1970 Review of *Mainstreams of Mathematics*, by J. B. Fraleigh. *Amer. Math. Monthly* 77:320.

Mathematical poetry and other short pieces:

1947 Trivial things. *Scripta Math.* 13:176.

1948 The present. *Scripta Math.* 14:98.

1949 Raymond Clare Archibald. *Scripta Math.* 15:65.

1950 Winter. *Scripta Math.* 16:71.

1953 Mathematician. *Christian Science Monitor*, 2 Nov.

1965 Collected mathematical poems. *Math. Teacher* 58:536–37.

1966a Me. *Amer. Math. Monthly* 73:732.

1966b Memo to a calculus class. *Math. Teacher* 59:542.

1966c The old oaken calculus problem. *Amer. Math. Monthly* 73:881.

1967 *Excavation and Other Verse*. Portland, ME: Anthoensen Press. Telegraphic review: *Amer. Math. Monthly* 76:577.

1968 Einstein and the ice-cream cone. *Math. Teacher* 61:404.

1973 Glossary. *Math. Mag.* 46:38.

1974 Hair. *Math. Mag.* 47:149. Abstract: *Hist. Math.* 2:118.

1975 Mini-profiles. *Math. Mag.* 48:199. Abstract: *Hist. Math.* (D. E. Kullman) 3:379.

1979a The Bernoullis. (Miscellanea #25). *Amer. Math. Monthly* 86:482.

1979b Vocabulary. *Math. Mag.* 52:291.

1981a Curves. *Math. Mag.* 54:130. With illustrations.

1981b Laplace transforms. *Math. Mag.* 54:78.

1981c Little green man. *Two-Year College Math. J.* 12:front cover. With illustrations.

1981d Three haiku: What is mathematics? (Miscellanea #63). *Amer. Math. Monthly* 88:626.

1982a ∀ and ∃. *Math. Mag.* 55:41.

1982b Mathematician. *Math. Mag.* 55:235. Version presented to the Poetry Soc. Amer., New York City, Feb 1981.

1983a A collection of mathematical poems by Katharine O'Brien. In *Mathematics 1984 Calendar*. Raleigh, NC: Rome Press.
1983b Paradoxes. *Math. Mag.* 56:176.
1984 Conversation piece. *Math. Mag.* 57:208.
1985 Measure theory. *Math. Mag.* 58:23.
1986 Bilateral convolution. (Miscellanea #169). *Amer. Math. Monthly* 93:399.

Presentations not listed above:
The theory of limits. Presented to the NCTM, Boston, 16 Apr 1955.
Some functions and their behavior. Five lectures presented to the Assoc. Teachers Math. New England, Hanover, NH, 22–24, 26, 27 Aug 1957.
Sequences, series, and limits. Presented to the NCTM, Boston, 15 Nov 1968.

References to: AmMSc 5–6, 8, 9P–11P; AmMWSc 12P–13P; ConAmC 1–2; IntWWM 10; IntWWP 5–6; WhoAmW 1–4, 4A, 6, 9–10.
"Katharine E. O'Brien: Math Teacher, Poet, Musician." (Obituary) *Portland Press Herald/Maine Sunday Telegram News Archive*, 11 Apr 1998.
"Katharine E. O'Brien, April 10, 1998." (Obituary) *Bates College Fall 1998 Alumni Magazine*.

Related manuscript material:
Katharine E. O'Brien 1901–. Maine Women Writers Collection. Abplanalp Library. Westbrook College Campus. University of New England. Portland, ME.

Other sources: PhD dissertation vita 1939; Smithsonian questionnaire 1985; Brown University Archives; Division of Rare and Manuscript Collections, Cornell University Library; communication with Bowdoin College Development Office and with Mu Alpha Theta; *Mathematically Speaking: A Dictionary of Quotations*, selected and arranged by C. C. Gaither and A. E. Cavazos-Gaither (Bristol: Institute of Physics Publishing, 1998); US Census 1900 MA, 1910, 1920 ME; SSDI.

Last modified: December 21, 2010.

OFFERMANN, Jessie (Jacobs). October 1, 1890–July 7, 1954.
McPherson College (BA 1914), University of Kansas (MA 1916), University of Illinois (PhD 1919).

Jessie Marie Jacobs was born in Wilmington, Delaware, the daughter of Annie Amelia (Wright) (1868–1930) and William C. Jacobs (1860–1942). Her mother was born in Pennsylvania; her father, a carriage maker, cabinet maker, and house carpenter, was born in Wisconsin. She had two sisters, Ella (b. 1888) and Sara (b. 1893). Her family moved to Kansas soon after Jessie Jacobs was born and was living in McPherson in central Kansas by 1900. She graduated from McPherson High School in 1907.

In 1910 both Jessie Jacobs and her older sister, Ella, were public school teachers. She was also a high school teacher in Kansas during the year 1911–12 and attended summer school, at least in the summer of 1913, before completing her undergraduate work at McPherson College in 1914. She was both a collegiate and a Bible student in 1913–14 and was one of thirteen in her senior class at McPherson, a private church-related college in her home town. She taught in high school in Kansas for a year after her graduation before going to the University of Kansas on a fellowship in 1915–16, one of the first two awarded to students in mathematics by the graduate school. Her master's thesis was supervised by Charles Hamilton Ashton, and was one of six master's degrees in mathematics awarded by Kansas in 1916.

The committee on fellowships at Kansas awarded her a fellowship for the year 1916–17, but she was released to accept a graduate assistantship at the University of Illinois for that year. She remained at Illinois as a fellowship holder from 1917 until she completed her dissertation in 1919 as a student of Arthur B. Coble. Her first minor subject was physical chemistry and her second minor subject was mathematical physics.

Jacobs was associate professor of mathematics and physics at Rockford College in Illinois the year after she received her doctorate. In 1920 she moved to a position as instructor in pure mathematics at the University of Texas. While in Austin she met Hermann Joseph Muller (1890–1967), a new associate professor of biology. Born and raised in New York City, he received his PhD from Columbia University in 1915, was at Rice Institute in Houston 1915–18, and was back at Columbia 1918–20. Elof Axel Carlson, in his biography of H. J. Muller, wrote that Jessie Jacobs helped Muller in 1921–22 "to work out a formula which could be used to choose the proper number of flies required to establish the validity of low frequencies of mutations or crossovers" (p. 131). Jacobs and Muller were married June 11, 1923, and she remained an instructor through the academic year 1923–24. Early in his career, Muller spoke on the need for the emancipation of women.

Their son, David Eugene Muller, was born November 2, 1924, in Austin. According to Carlson, "the mathematics department terminated her appointment because her colleagues felt that a mother could not give full attention to classroom duties and remain a good mother. For Jessie it meant a permanent loss of her career as a teacher..." (pp. 133–34). Carlson also reported that during the spring of 1925 the Mullers were looking to leave the University of Texas. However, they remained in Austin for the next several years, except for occasional summers away. In 1925 Jessie Jacobs-Muller collaborated with her husband and received acknowledgement in one of his papers and joint authorship of another.

Jessie Muller's mother died in the summer of 1930, and that fall the Mullers moved into a new rented house in Austin. Their son started private school because he was still too young to enter public school. At this time Hermann Muller was continuing his pioneering work on the effects of radium radiation on the genetics of fruit flies, and, according to a 1997 account by David Muller, Jessie Muller was helping her husband in the laboratory in addition to taking care of their son and the house. H. J. Muller mentions her work of 1931 in a 1954 paper. Also in 1931, Muller was elected to the National Academy of Sciences. He was awarded a Nobel Prize in 1946 for work done during this period and spoke on that work in his 1958 Gibbs lecture to the AMS.

During the early 1930s H. J. Muller's political views became more public and tensions in his marriage increased. He was involved with the National Student League, an off-campus group with communist supporters and socialist ideals, and in an August 1932 speech to the Third International Congress of Eugenics he criticized the American eugenics movement for racism and prejudice against the lower classes. Just after this speech he left the United States to spend a year separated from his wife and son as a Guggenheim fellow in Berlin. In July 1933 his family joined him in Berlin, and two months later they all moved to a friendlier political climate in Leningrad, where Muller had moved as senior geneticist at the Institute of Genetics of the Academy of Sciences of the USSR. Muller's son indicated in 1997 that plans for a divorce started about that time. In July 1934 Jessie and David returned to Austin. When the Academy and its offices and laboratories moved to Moscow late in 1934, H. J. Muller moved there as well.

Back in Austin, in the depths of the Great Depression, Jessie Muller obtained a job with the Works Progress Administration for sixty-five dollars a month. The marriage was dissolved in Moscow on January 5, 1935. Jessie Muller obtained a letter from the embassy, so that she could proceed to obtain a Texas divorce in the summer of 1935.

Carlos Alberto Offermann, born in Argentina on May 6, 1904, had come to the University of Texas in December 1930 to work in Muller's laboratory and joined Muller in Leningrad the year Jessie and David Muller were there. Offermann visited Austin during the period October 1935 to January 1936, and it was apparently at this time that he and Jessie Muller were married in Georgetown, Texas. Carlos Offermann then returned to his position in Muller's laboratory in Moscow, where he remained until December 1937. A Texas judge refused to permit Jessie Offermann to take her son out of Texas as long as his father was in the Soviet Union, so she was unable to join her new husband in Moscow.

Jessie Offermann and her son remained in Austin, where she became supervisor of a WPA group that was writing a history of Travis County, and, as her son reported, "when they discovered that she could write well her salary went up to over 100 dollars." She also made money by renting a room in their small apartment and by tutoring university students in mathematics. Carlos Offermann returned to Austin in 1938 after visiting with his family in Argentina for a few months.

With the rise of Stalinism, H. J. Muller left the Soviet Union for a position in Edinburgh, and David Muller was permitted to leave Texas. In fall 1938 the Offermanns moved to Chicago, where Carlos Offermann, with his wife's help, worked intensely to complete the experimental work for a PhD at the University of Chicago. However, during the year 1939–40 she was diagnosed as having tuberculosis. In the

summer of 1940 they moved to southern California, where they hoped she could rest and recover and where perhaps he could finish his dissertation. In 1940–41 they lived in Altadena and the following year bought a house in Monrovia, both in the San Gabriel Valley in Los Angeles County.

Jessie Offermann lived in the house until 1942, when her health deteriorated and she entered a sanitarium in Monrovia. Later she moved to the Olive View sanitarium in the San Fernando Valley. By 1946 she had moved to the City of Hope in Duarte, California, closer to Monrovia. Jessie Offermann died there in 1954 at age sixty-three after being in the City of Hope Medical Center for seven weeks. Her death occurred a day after surgery was performed to provide some relief from the tuberculosis. Her body was cremated. Carlos Offermann died in October 1983.

David Muller, Jessie Offermann's son who earned a PhD in physics from the California Institute of Technology in 1951, wrote in 1997, "There is no doubt that my interest in, and satisfaction with, mathematics began with my mother who spent many hours talking to me about mathematics and teaching me many things while I was still very young. During my 40 years at Illinois in the mathematics department I have had over a dozen Ph.D. students of my own who may be thought of as her mathematical grandchildren."

Organizational affiliations: AMS, MAA (charter member), AAAS.

Thesis and dissertation:
1916 [Jacobs, J. M.] The Riemann surface for the function $w^2 = z^3 + 3tz + 2$. MA thesis, University of Kansas, directed by Charles Hamilton Ashton.
1919 [Jacobs, J. M.] The trilinear binary form as a cubic surface. PhD dissertation, University of Illinois, directed by Arthur Byron Coble. Typescript.

Publications:
1925 [Jacobs-Muller, J. M.] With H. J. Muller. The standard errors of chromosome distances and coincidence. *Genetics* 10:509–24.
1931 [Jacobs, J. M.] Reaching the individual in mathematics instruction. *Sch. Sci. Math.* 31:575–85.

References to: AmMSc 3–6.

Other sources: PhD dissertation vita 1919; private communications with David Muller 1997; conversations with Chandra Muller, granddaughter; communication with McPherson College Archives; Price, *History of the Department of Mathematics of the University of Kansas*; Elof Axel Carlson, *Genes, Radiation, and Society: The Life and Work of H. J. Muller*, (Ithaca, NY: Cornell University Press, 1981); US Census 1900, 1910, 1920, 1930 KS, 1930 TX; California death certificate.

Last modified: September 23, 2015.

OLSON, Emma J. December 7, 1892–November 14, 1981.
University of South Dakota (BA 1915), University of Chicago (MA 1924, PhD 1932).

Emma Julia Olson was born in Fairview, South Dakota, the fourth of seven surviving children of Julia (Erickson) (1860–1929) and Sven Olson (1848–1940), both natives of Norway. Her parents farmed in Lincoln County, South Dakota, near the Iowa border. She had four sisters and two brothers: Annetta Celia (1883–1955), Anna Marie (1885–1973), Oscar S. (1889–1968), Nora B. (1894–1984), Henry C. (1898–1928), and Selma G. (1899–1978).

Olson received her high school and her college education at the University of South Dakota and earned her bachelor's degree in June 1915. From 1916 to 1919 she taught mathematics, physics, and chemistry at a high school in Milbank, South Dakota. From 1920 to 1923 she taught at the College of Industrial Arts, a college for women in Denton, Texas, which was renamed Texas State College for Women in 1934 and has been Texas Woman's University since 1957.

In September 1923 she entered the University of Chicago, studied there for four consecutive quarters, wrote her master's thesis under the direction of E. P. Lane, and received her degree in August 1924. During the second semester of 1924–25, she was acting head of the department at the River Falls Normal School, which in 1926 became the River Falls State Teachers College, and is now the University of Wisconsin-River Falls. From 1926 to 1930 she taught at Northwestern University in Evanston, Illinois.

Olson resumed her graduate work at the University of Chicago and completed the work for her PhD in 1932 with a dissertation in projective differential geometry, again directed by E. P. Lane. She was acting head of the department at Mount Saint Scholastica College in Atchison, Kansas, during the second semester of 1934–35 and was assistant professor at Concordia College in Moorhead, Minnesota, 1935–36.

In January 1937 Olson joined the faculty at Kent State University in Kent, Ohio. She was instructor 1937–40, assistant professor 1940–45, associate professor 1945–51, professor 1951–63, and emeritus professor after her retirement in 1963. Frances Harshbarger had come to Kent State a year before Olson and also spent the rest of her career there.

Emma Olson traveled widely in Europe, Scandinavia, and "the Holy Land." After her retirement, she returned to the county of her birth and died at the Good Samaritan Center in Canton, South Dakota, of pneumonia and congestive heart failure at age eighty-eight in 1981. She was survived by a sister and nieces and nephews and was buried in Fairview, South Dakota.

Organizational affiliations: AMS, MAA, AAAS (fellow), Sigma Delta Epsilon, AAUP, Sigma Xi.

Thesis and dissertation:

1924 Metric classification of pencils of conics. MA thesis, University of Chicago, directed by Ernest Preston Lane.

1932 Conjugate systems characterized by special properties of their ray congruences. PhD dissertation, University of Chicago, directed by Ernest Preston Lane. Private edition, 1934, distributed by the University of Chicago Libraries.

References to: AmMSc 8, 9P–11P.

Other sources: South Dakota birth certificate; MA thesis vita 1924; PhD dissertation vita 1932; Owens questionnaires 1937, 1940; Register of Deeds, Lincoln County, SD; communication with Kent State University Archives; US Census 1910, 1920 SD, 1930 IL; South Dakota death certificate.

Last modified: December 12, 2008.

OWENS, Helen (Brewster). April 2, 1881–June 6, 1968.
University of Kansas (BA 1900, MA 1901), Cornell University (PhD 1910).

Helen Barten Brewster was born in Pleasanton, Linn County, Kansas, the only child of Clara (Linton) (1850–1933), originally of Ohio, and Robert Edward Brewster (b. ca. 1840), a native of New York. In 1880 her parents were living in Linn County, where her father, a Civil War veteran, was a farmer. Her parents had married in about 1880, and it appears her father died in 1892.

Helen Brewster did her college preparation in three years at the Pleasanton High School and entered the University of Kansas in Lawrence in September 1897, when she was sixteen. In the 1900 census she was enumerated with her widowed mother, a school teacher, and with her maternal grandmother in Pleasanton. She and her mother were enumerated a second time in 1900 as boarders in Lawrence, where she was a student.

Helen B. Brewster earned her bachelor's degree from Kansas in 1900 and her master's degree in 1901. The following year she was a teaching fellow at Kansas and published an article, possibly her master's thesis, in which she expressed her gratitude to Henry B. Newson, the husband of Mary Winston Newson. In a letter of January 31, 1936, she wrote to "Mrs. Newson" that "through all these years you and your husband have been vital influences in our lives" (transcription in authors' possession). Brewster continued her graduate studies at the University of Kansas until June 1903 and taught high school in Lawrence from 1902 until 1904.

On June 22, 1904, in Pleasanton, Kansas, Helen Brewster married Frederick William Owens, who had also studied mathematics with H. B. Newson at the University of Kansas. F. W. Owens was born in Rockwell City, Iowa, on November 18, 1880. He received a bachelor's degree and a master's degree from Kansas in 1902 and remained as a teaching fellow 1902–03. During 1903–05 he was a resident graduate student in mathematics and astronomy at the University of Chicago. Helen B. Owens studied at the University of Chicago in the summer and autumn quarters of 1904. Their first daughter, Helen Brewster, was born in May 1905 in Illinois. F. W. Owens taught at the academy of Northwestern University in Evanston, Illinois, 1905–07, and Helen Owens returned to high school teaching in 1906 and taught through 1907 in Evanston. In 1907 F. W. Owens received his PhD from the University of Chicago and took a position as instructor of mathematics at Cornell University in Ithaca, New York. Their second daughter, Clara Brewster, was born in February 1908. Helen Owens enrolled as a graduate student at Cornell the following academic year and received her PhD in 1910 with a dissertation written under the direction of Virgil Snyder. She presented minors in physics with Ernest Merritt and mathematical physics with James McMahon.

Helen Owens worked as a private teacher of mathematics in Ithaca for several years starting in 1908 and taught at Wells College, a women's college in Aurora, about thirty miles from Ithaca, on two occasions. She was an instructor at Wells second semester 1914–15 and an acting assistant professor second semester 1916–17. In the first term of 1916–17 she successfully completed a Cornell graduate course, Clothing 16, a sewing course that would have been offered by the home economics department of the Cornell College of Agriculture.

From 1911 to 1917 Owens also campaigned for women's suffrage in Kansas and in New York State. Owens was a state organizer for the Kansas Equal Suffrage

Association during the successful campaign of 1911–12. A newspaper article based on an interview with Owens in 1960 reported that "her first interest in women's suffrage started, when, as a small child, she accompanied her mother, [who was] president of the Linn County Women's Suffrage Assn. in Kansas, to the County Fair" ("Women Voters to Mark 40th"). She also said that at the fair she helped distribute copies of a photograph of the temperance leader, Frances Willard, that had been taken with "her 'political peers,' the disenfranchised men, including maniacs, condemned criminals, idiots and such." In 1911 her mother was invited to Kansas to lecture on women's suffrage; Helen Owens went instead. In a 1943 article on the Kansas suffrage campaign, it was reported that "Dr. Helen Brewster Owens, a Kansas girl living in New York, offered to pay her way to Kansas and give eight weeks of her time to the work, providing her expenses in the state were paid. She came in November and proved a most efficient organizer. The next year she returned and was paid by the national association" ("The woman suffrage campaign of 1912," 304). The article credits the help of out-of-state workers for the successful campaign. In particular, Owens "remained as a field organizer until the last of July [1912] when overcome by heat, she went home for a month's rest. Returning the following September, she worked unceasingly until the election" (p. 312). After her experience in Kansas, Owens continued her work for women's suffrage in New York State as a district chairman of the Empire State Campaign Committee 1913–15 while Carrie Chapman Catt was president of the state organization. Although the 1915 referendum was unsuccessful, Owens remained active in the state campaign until women in New York won the right to vote in 1917.

She wrote for her entry in J. W. Leonard's 1914 *Woman's Who's Who of America* that she was "interested in various organizations for civic improvement and high ideals" (p. 615). She included her presidencies of the Political Study Club of Ithaca and the Tompkins County Equal Suffrage Association, as well as memberships in the Woman's Christian Temperance Union, the Civic Improvement League, and the Cornell Consumers' League.

Helen Owens was an instructor at Cornell University 1917–1922, where she taught such courses as advanced algebra, advanced analytic geometry, calculus, differential equations, and projective geometry. Owens also sometimes served as the faculty advisor to the Cornell mathematics club that was organized in November 1919. During the years 1908 to 1926 she was intermittently employed as a secondary school teacher and as a private tutor, and in 1922 she was the first national treasurer of Sigma Delta Epsilon (now Sigma Delta Epsilon-Graduate Women in Science), a fraternal order for graduate women in science founded at Cornell in 1921.

In 1926 F. W. Owens assumed the headship of the mathematics department at Pennsylvania State College (now Pennsylvania State University) in State College. After their move to Pennsylvania, Helen Owens returned to Ithaca for private tutoring for three months each academic year until 1928.

In the letter of January 31, 1936, to Mary Winston Newson, Helen Owens recounts a number of events in her life and describes some aspects of her current situation. She noted that both of her daughters graduated from Cornell, but then recounted "crushing blows." First, her elder daughter, Helen, had died in 1928. "I still find myself unreconciled and incapable of talking about it." Newspaper accounts at the time indicate that, according to friends, Helen, a medical student at the University of Chicago, drank poison, partly out of despair over her desire

to marry, which was in conflict with her parents' wishes that she wait until she finished medical school, and partly because of her lack of success in some of her courses. The younger daughter, Clara, married a medical school classmate in June 1930, and both received their MD degrees from Cornell University Medical College and became parents of a son in June 1931. Owens continued her description of the "crushing blows" to include the December 1931 death of Clara's husband as a result of a staphylococci infection caused when he "nipped a tiny pimple on his upper lip in shaving." Clara began her residency in New York the following month while Helen and Frederick Owens cared for her son. After beginning her practice in State College in October 1933, Clara and her young son, continued to live in the Owens household until at least sometime in 1936. Helen Owens also related that her mother, who had lived with them for twenty-six years, had died in the spring of 1933.

Helen Owens then moved on to happier topics in her letter and described her teaching and tutoring before her eldest daughter's death. She also noted in the margin, "I see I did not explain – a state ruling makes it impossible for two members of same family to teach at same school." She wrote that she would regularly get together with the women in the Penn State mathematics department, Teresa Cohen, Beatrice Hagen, and Aline Huke Frink, and read mathematical textbooks; they had read Sierpinski's *Introduction to General Topology* and were then reading Harold Hilton's *Plane Algebraic Curves*.

In 1934 Helen B. and F. W. Owens took a trip that included visits to all forty-eight states as well as Mexico and Canada. In March they stopped in Topeka, Kansas, to attend a meeting of the Kansas Section of the MAA. The report of the meeting noted that they "were passing through Kansas on their way to a six months' rest in California" (*Amer. Math. Monthly* 41:405). Other mathematics meetings they attended that year were an AMS meeting in June in Berkeley, California, the AMS and MAA summer meetings in Williamstown, Massachusetts, an AMS meeting in October in New York City, and the annual December AMS and MAA meetings in Pittsburgh, Pennsylvania. They had been attending the summer meetings every year since 1929, and from 1934 until the United States entered World War II in December 1941 they attended an average of two other AMS meetings a year.

From 1935 to 1938 Helen Owens was an associate editor of the *American Mathematical Monthly* and edited the Mathematical Clubs section with her husband. During the late 1930s she formed a committee for the study of women's work in mathematics; she corresponded with various institutions and organizations and sent questionnaires to those North American women she was able to identify as holding PhD's in mathematics. At the summer mathematics meetings of 1937 in State College, she organized a luncheon honoring women pioneers in mathematical research in America. R. G. D. Richardson, then secretary of the AMS, suggested that she prepare a talk on her findings to be given to the MAA and a paper for inclusion in the *Monthly*. Although that presentation was never made, she did circulate a second round of questionnaires in 1940 and, at about that time, gave a speech, most likely at a meeting of Sigma Delta Epsilon, "Early Scientific Work of Women and Women in Mathematics." Correspondence, completed questionnaires, a copy of the talk, and other materials related to her study of women's work in mathematics

are in her papers at the Schlesinger Library. Notes for, and a draft of, a book on women in mathematics and science are also listed as being in these papers.

Several of the letters in Owens' papers at the Schlesinger Library indicate that she was much appreciated by other women mathematicians. For example, on February 4, 1937, Sister Mary Felice Vaudreuil wrote about the 1936 summer meetings: "We Sisters appreciated very much your kind friendliness toward us at the Boston meeting. I can well understand that most people do not know what to make of us so we appreciate the more the friendliness of those who are kind to us. Such meetings are a very great inspiration and I like to attend them in spite of the fact that my dress seems out of place." Later, on May 22, 1940, Ruth Mason Ballard wrote to Owens that "you were so kind to me ... when I was homeless and jobless, that you have a very special place in my regard."

In 1940 Helen Owens was hired as an instructor by Pennsylvania State College and was promoted to assistant professor in 1945. Both she and her husband retired in 1949, she as assistant professor emeritus and he as professor emeritus. They were living in State College at the time of the death of F. W. Owens on June 23, 1961. She lived the last three years of her life at the home of her surviving daughter, a physician at the Newton D. Baker Veterans Hospital in Martinsburg, West Virginia. Helen B. Owens died in Martinsburg in 1968 at age eighty-seven. In her 1936 letter to Mary Newson she had expressed her preference for cremation. She was survived by her daughter and five grandchildren.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, AAUW, Sigma Xi, Pi Mu Epsilon.

Dissertation:

1910 Conjugate line congruences of the third order defined by a family of quadrics. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1913, reprinted from *Amer. J. Math.* 35:323–56.

Publications:

1902 [Brewster, H. B.] On collineations of space which leave invariant a quadric surface. *Kansas Univ. Sci. Bull.* 1:281–303. Reviews: *JFM* 34.0678.01 (E. Salkowski); *Rev. semestr. publ. math.* 11, pt. 2: 17 (E. N. Martin). Presented by H. B. Newson as "The group of collineations leaving a quadric surface invariant" to the AMS, Evanston, IL, 3 Sep 1902; abstract: *Bull. Amer. Math. Soc.* 9:93 #30.

1913 Conjugate line congruences of the third order defined by a family of quadrics. *Amer. J. Math.* 35:323–56. Published version of PhD dissertation. Reviews: *JFM* 44.0746.01 (E. Lampe); *Rev. semestr. publ. math.* 22, pt. 1: 2 (E. B. Cowley).

1927 Review of *College Geometry*, by N. A. Court. *Amer. Math. Monthly* 34:326–28.

1936a with F. W. Owens. A directory of mathematics clubs in colleges and universities of the United States and Canada. *Amer. Math. Monthly* 43:420–31.

1936b with F. W. Owens. Kappa Mu Epsilon. *Amer. Math. Monthly* 43:182.

1936c with F. W. Owens. Kappa Mu Epsilon of Northeastern Teachers College, Oklahoma. *Amer. Math. Monthly* 43:102.

1940 Review of *Mathematical Clubs and Recreations*, by S. I. Jones. *Amer. Math. Monthly* 47:559.

Abstract not listed above:

1939 Mathematics clubs, old and new. *Amer. Math. Monthly* 47:139 #5. Presented to the MAA, Bethlehem, PA, 2 Dec 1939.

References to: BioWMath, WhoAmW 2, WomWWA.

Rogers, Mary B. "Women Voters to Mark 40th: State College Woman Fought in 1st Ranks of Battle for Equal Suffrage." *Centre Daily Times* (State College and Bellefonte, PA), 25 Aug 1960.
"Deaths: Dr. Helen B. Owens." *Martinsburg Journal*, 7 Jun 1968.

Related manuscript material:
Helen Brewster Owens Papers, 1867–1948. Schlesinger Library, Radcliffe Institute, Harvard University. Finding aid.

Other sources: Transcription of letter from Helen Brewster Owens to Mrs. Newson, 31 Jan 1936, given to the authors by Caroline Newson Beshers, a copy of which also is in the Mary Winston Newson Papers in the Sophia Smith Collection; Division of Rare and Manuscript Collections, Cornell University Library; Sophia Smith Collection, Smith College; communication with Wells College Archives; Martha B. Caldwell, "The woman suffrage campaign of 1912," *Kansas Historical Quarterly* 12 (1943): 300–326; WhAm 4 (Owens, Frederick William); US Census 1880, 1900 KS, 1910, 1920 NY, 1930 PA.

Last modified: December 22, 2010.

PEIRCE, Leona May. August 4, 1863–September 27, 1954.
Smith College (BA 1886, MA 1893), Yale University (PhD 1899).

Leona May Peirce was born in Norway, Maine, which was also the birthplace of her mother, Mary Hobbs (Foster), born in 1839. Her father, Levi Merriam Peirce (also "Pierce"), was born in West Boylston, Massachusetts, in 1833. He received a bachelor's degree from Waterville College (now Colby College) in Maine in 1860 and married two years later. He was a teacher for nearly a dozen years before starting a music company specializing in the sale of pianos and organs in Springfield, Massachusetts; he was a music dealer for more than thirty years. Leona Peirce had one sibling, William Foster Peirce (1868–1967), who was born in Chicopee Falls, Massachusetts, graduated from Amherst College in 1888, and served as president of Kenyon College in Ohio from 1896 until 1937.

Leona Peirce attended Springfield High School and taught elementary subjects in a private school in Springfield for a year before entering Smith College in 1882. Her main subjects at Smith were rhetoric and history, with only the required mathematics courses. After her graduation from Smith in 1886, she taught mathematics, physics, and chemistry at the Springfield Collegiate Institute for three years, 1886–89. In the summer of 1887 she studied chemistry and French at Amherst College.

During the following decade, Peirce was primarily engaged in study, with the focus becoming mathematics. She enrolled at Cornell 1889–90 as a candidate for an advanced degree studying mathematics, physics, and philosophy and took courses in mathematics and history of philosophy. She spent the following year, 1890–91, teaching mathematics at the Mount Hermon School for boys in Mt. Hermon, Massachusetts, before returning to her studies. During 1891–92 she studied mathematics at Newnham College, Cambridge, and in 1892–93 she was at Smith College, where she completed work for a master's degree in 1893. She returned to Cornell in 1893 and again studied mathematics and philosophy. She was there for a year before leaving because of illness in her family.

Following the suggestion of the Cornell mathematics department, Peirce arranged to study privately with William E. Story of Clark University, a school in Worcester, Massachusetts, that did not yet formally admit women to its doctoral programs. This arrangement was made with the understanding that Peirce would return to Cornell for her final examinations and present a thesis written under Story's direction. After working with Story for three years, she submitted her thesis at Cornell in spring 1897 but did not receive a Cornell PhD owing to an apparently irresolvable disagreement concerning the requirements for the final examination in one of her minor subjects. The examining committee believed that the originally stated requirements for her minor in the theory of functions were not sufficient to demonstrate competence in the subject and recommended her retaking the examination in three or four months after studying additional material. On the other hand, Story believed that she possessed the knowledge required for a PhD in mathematics and should not have been asked to satisfy additional requirements. Following Story's advice, Peirce did not retake the minor examination. Instead, she continued to work with him and then enrolled at Yale a year later. She received her PhD from Yale in 1899 after having taken a year of course work. Her dissertation, most likely

nearly the same as that deemed satisfactory by the Cornell examiners, was read and approved by Story and by Henry Seely White, then of Northwestern University.

Peirce did not return to teaching mathematics for almost thirty years. During most of the intervening years she was at her family home in Springfield. Upon the death of her father in 1908, she undertook the management, and was treasurer, of the L. M. Pierce Co., her father's music company.

Peirce was also involved in numerous civic and women's organizations. She served as trustee of the Wesson Memorial Hospital, as secretary of the Wesson Memorial Hospital Visitors' Aid Association, and as a member of the Springfield school board. She was an officer of many other organizations. She was recording secretary of the Springfield Women's Club, president of the Western Massachusetts Branch of the Association of Collegiate Alumnae, delegate to the biennial convention of the General Federation of Women's Clubs (1904 in St. Louis), president of the Springfield College Club, director of the Springfield Civil Service Reform League, and president of the Western Branch of the Smith College Alumnae Association. She was a member of Kappa Alpha Theta, a social sorority; the Smith College Students' Aid Association; and the Congregational church.

In 1914 Peirce listed her hobbies as "driving and automobiling" (WomWWA). She also noted that she "was a contributor of articles to local newspapers on public matters." That year she traveled for several months with her brother in Italy.

In 1928 Peirce began teaching mathematics and physics at the Barrington School for Girls in Great Barrington, Massachusetts. During the summers of 1930 through 1932 she studied mathematics at Harvard. She left the Barrington school in 1932 and for the next two years taught mathematics and English at the Leominster, Massachusetts, high school.

Leona Peirce had retired by 1937. She died in 1954 at ninety-one in an old age home in Springfield after a short illness. She was survived by her brother.

Organizational affiliations: ACA (later AAUW), Phi Beta Kappa.

Dissertation:
1899 On chain-differentiants of a ternary quantic. PhD dissertation, Yale University, directed by William Edward Story [Clark University].

References to: BioWMath, WomWWA.
"Miss Leona M. Peirce." (Obituary) *New York Times*, 29 Sept 1954.
"Leona May Peirce." (Obituary) *Smith Alumnae Quarterly*, Fall 1964, 63.

Other sources: Owens questionnaire 1937; Williams Papers; Division of Rare and Manuscript Collections, Cornell University Library; Smith College Archives; Yale University Archives; NatCAB 8 (Peirce, William Foster); William A. Koelsch, *Clark University 1887–1987: A Narrative History* (Worcester, MA: Clark University Press, 1987); US Census 1870, 1880, 1900, 1910, 1920, 1930 MA.

Last modified: July 20, 2009.

PENCE, Sallie E. September 5, 1893–July 26, 1989.
University of Kentucky (BA 1914, MA 1928), University of Illinois (PhD 1937).

Sallie Elizabeth Pence was born in Lexington, Kentucky, a daughter of Belle (Kelly) (1862–1954) and Merry Lewis Pence (1854–1938), natives of Kentucky who married in 1882. She was the seventh of eight children, with older siblings Alice (b. 1883), Merry Lewis (1884–1966), Kate (b. 1886), Christina (b. 1887), Mary (b. 1889), and Edgar (b. 1891), and younger brother, Robert (1898–1954). Her father, Merry Lewis Pence, graduated in 1881 from what was then the Agricultural and Mechanical College of Kentucky, and earned a master's degree in 1885. He joined the New York Mathematical Society in 1891 and remained a member through at least 1894 when it became the American Mathematical Society. He taught for over fifty years and for nearly forty years served at what eventually became the University of Kentucky, first as professor of civil engineering and physics and then as head of the physics department that he established. Pence Hall on the campus is named for him. The university gives the Merry Lewis Pence Award for the outstanding senior physics major annually. Four of his five daughters graduated from the University of Kentucky.

Sallie Pence attended public schools in Lexington, Kentucky, for ten years and the academy of the State University of Kentucky for one year before graduating in 1910 and entering the State University, renamed the University of Kentucky in 1916. She received her bachelor's degree in 1914, having majored in modern languages. While at the university she was a member of the women's basketball team; a campus drama production company; Mortar Board; and Alpha Gamma Delta, a social sorority.

From 1914 until 1927 Pence taught in high schools in Owensboro, Bellevue, Hazard, and Morganfield, Kentucky, and she attended George Peabody College for Teachers in Nashville, Tennessee, during the summer of 1921. She began work in mathematics at the University of Kentucky in the summer of 1922. After spending the summers of 1926 and 1927 as a graduate student and the following year as a fellow, she completed the work for her master's degree. Upon receiving that degree in 1928 Pence became an instructor at Murray Normal School and Teachers College (now Murray State University) in Kentucky. The following year she was hired as an instructor at the University of Kentucky, where, except for leaves, she spent the remainder of her career.

While teaching at Kentucky, Pence continued taking mathematics courses there before attending Cornell University during the summers of 1932 and 1933. Virgil Snyder, from whom she took courses both summers, described her as "a very good student" at the end of the first and "an excellent student" at the end of the second (Cornell University Graduate School Files). Pence took a leave of absence from Kentucky to attend the University of Illinois 1934–35. She was an assistant in mathematics at Illinois in 1935–36, remained for the summer, and returned for the second semester of 1936–37 to complete the work for her PhD. Her major field was geometry with a minor in astronomy.

In 1938, a year after receiving her doctorate, Pence was promoted to assistant professor at Kentucky. She was promoted to associate professor in 1947, served as chairman of the division of physical science 1954–55, and was promoted to professor in 1956, seven years before her retirement in 1963. While at Kentucky, Pence was

active in professional organizations, particularly the MAA. She was secretary of the Kentucky Section 1947–49 and chairman of the section 1953–54; she was official MAA lecturer to Kentucky high schools in 1958–59 and was executive director of the MAA high school lecture program under the sponsorship of the National Science Foundation 1962–63. In 1957 Pence directed a summer seminar for in-service high school mathematics teachers. Pence was also executive director of the University of Kentucky high school honors examinations in mathematics 1959–63.

Immediately after her retirement in 1963 Pence headed for Europe with a friend for a four-month trip to Britain, France, Switzerland, Greece, and finally Turkey, where she was to be entertained by the parents of one of her students. Pence did some part-time teaching at the University of Kentucky after her retirement, and from 1964 until 1966 she was professor at East Carolina College (now East Carolina University) in Greenville, North Carolina. She was a visiting distinguished professor there 1966–67.

Pence had a number of interests and appeared to excel in each. These included golf, philately, photography, and travel. She belonged to the Winchester, Kentucky, Country Club and the Henry Clay Philatelic Society, the latter of which awarded her first place for having the best stamp collection among its members in 1939. She was a member of the Lexington Camera Club, was described as an expert photographer, and was frequently invited to give slide presentations and talks to various clubs and professional groups about her travels. She was a member of the Lexington Business and Professional Women's Club, the Woman's Club of Central Kentucky, the Kentucky Archaeological Society, the Order of the Eastern Star, and the Daughters of the American Revolution, among others. She was also active in the Calvary Baptist Church, was a member of the Business Women's Missionary Circle, and described herself as a Democrat.

Sallie Pence died at the age of ninety-five at the Sayre Christian Village Nursing Home in Lexington. She was survived by several nieces and nephews. The Sallie E. Pence Award was established by the University of Kentucky board of trustees and is given annually to outstanding mathematics and mathematics education majors at the University of Kentucky who plan to pursue a career in teaching.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, AAUW, AAUP, Pi Mu Epsilon.

Thesis and dissertation:
1928 Cryptology. MA thesis, University of Kentucky.
1937 The configuration of the double points of cubics of a pencil. PhD dissertation, University of Illinois, directed by Arnold Emch. Typescript. Abstract of dissertation, 1937, Urbana, IL.

Publication:
1963 with members of Committee on College Algebra, J. C. Eaves, ed. *College Algebra and Basic Set Theory*. Second ed. New York: Pitman Publishing Co.

Abstracts:
1938 Configuration of double points of cubics of a pencil. *Amer. Math. Monthly* 45:648–49 #4. Presented to the MAA, Morehead, KY, 14 May 1938. Based on PhD dissertation.
1944 Code writing. *Amer. Math. Monthly* 51:492 #5. Presented to the MAA, Lexington, KY, 29 Apr 1944.

Presentations not listed above:
Problems involving linkages. Presented to the MAA, Lexington, KY, 14 May 1932.

Report on the visiting lecture program. Presented to the MAA, Danville, KY, 25 Apr 1959.

References to: AmMSc7–8, 9P–11P; AmWom 1935–40; WhoAmW 1.
"Dr. Pence Retires from U.K. Faculty." *Louisville Courier–Journal*, 20 Jun 1963.
"Sallie Elizabeth Pence, Retired UK Professor." (Obituary) *Lexington Herald-Leader*, 27 Jul 1989.

Other sources: PhD dissertation vita 1937; Cornell University Archives; communication with University of Kentucky Archives; US Census 1900, 1910, 1920, 1930 KY.

Last modified: July 20, 2009.

PEPPER, Echo D. June 3, 1897–January 5, 1979.
University of Washington (BS 1920, MS 1922), University of Chicago (PhD 1925).

Echo Delores Pepper was the second child of Josephine LaBena (Sanderson) (1872–1930) and Albert Ephraim Pepper (1872–1944). Her mother and father were born and married in Ontario, Canada. They were in the process of moving to the United States when her older sister, Leah H. (1896–1966), was born on a Native American reservation in Canada. Just after Echo Pepper's birth in Spokane, Washington, the family moved to Seattle where her parents and older sister remained the rest of their lives. At various times other relatives lived with them; her father's younger sister was with them in 1900 as was his seventeen-year-old nephew from Canada in 1920. Both parents were trained as accountants, and after working one year as a bookkeeper in the United States, her father was self-employed and her mother helped in his businesses. Until the Depression they were very successful running first a plumbing company and a funeral home and, later, hotels and apartment houses. Echo Pepper's brother, Vincent A., was born in May 1927. In the 1930s her father had a sheep ranch outside of Seattle that he traded for an apartment house.

When Echo Pepper was seven, she was ill and lost the use of her right hip, although an operation improved the situation so that she could walk without crutches by about the time she entered high school. She received all of her education in Seattle until she was twenty-five. She was taught at home for several years because of her hip problem. She also attended a convent school, Holy Names Academy, and then a public high school, Franklin High School, from which she graduated in 1916. She then attended the University of Washington, where she studied mathematics and physics under E. T. Bell among others for her bachelor's and master's work. Pepper received her BS in 1920 and held a teaching fellowship in mathematics there in 1920–22. She received her MS in 1922 with a thesis referred to as having "exceptional merit" in Constance Reid's biography of Bell (*The Search for E. T. Bell*, 192). In the summer of 1922 Pepper studied with G. D. Birkhoff and L. E. Dickson at the University of California. In 1922–23 she served as an associate at the University of Washington, replacing a faculty member who was on leave.

During the years 1923–25 Pepper was a fellow at the University of Chicago. On August 28, 1924, E. T. Bell, who had taught during the summer quarter at Chicago, reported to E. H. Moore that "Miss Pepper is wholly absorbed in the topic which Mr. Dickson assigned her. I believe she is young enough, and sufficiently ambitious, to prosper by a chance to study with G. H. Hardy, provided the opportunity be given her. By the end of this year she should have mastered the rudiments of research. In my own stuff she has done fine work" (folder 8, box 1, E. H. Moore Papers, University of Chicago Archives, Special Collections Research Center). Pepper's work as a student of Dickson resulted in her dissertation, "Theory of algebras over a quasi-field," and in 1925–26, the year after her PhD (awarded December 1925), she studied with Hardy and A. S. Besicovitch at Oxford University as a holder of a National Research Council fellowship.

Upon Pepper's return from England she went to Bryn Mawr College as instructor for the years 1926–28. While there she taught trigonometry, calculus, advanced calculus, differential equations, and number theory and taught at both the undergraduate and graduate levels.

In 1928 Echo D. Pepper moved to the University of Illinois where she remained most of the rest of her career. She was instructor 1928–29 and associate (similar to senior instructor) 1929–45. During this period she was active in Sigma Delta Epsilon, a society for graduate women in science, and served as national treasurer in 1937 and 1938 and as first vice president in 1944 and 1945. Later, in 1955-57, she served as the business manager of the *Pi Mu Epsilon Journal*. She also was a member of the Illinois Academy of Science.

In the summer of 1945 Pepper applied for a leave of absence to be in Seattle for the year 1945–46, in order to spend time with her family following her father's death and also to be in the less harsh climate. The university president denied the request but indicated that the department might wish to have a formal understanding that she would be reappointed after the year. Thus, Pepper was in Seattle in 1945–46 and while there taught mathematics and physics as assistant professor at Seattle College (now University) at the time that her brother was a student there. She returned to Illinois in 1946 as assistant professor and remained in that rank until 1960.

During the spring of 1952 Pepper had a corrective bone operation and was granted a leave for the fall semester of 1952–53. From about that time she was connected with the rehabilitation program at the University of Illinois. She was the chaperon of a wheelchair basketball team at the university and was later awarded an honorary life membership in Delta Sigma Omicron, a rehabilitation service fraternity on the Illinois campus.

Pepper taught some summers at Southern Illinois University in Carbondale to instruct teachers how to teach the "new math." In the spring of 1960 Pepper was considering moving to Southern Illinois at a considerably higher salary than she was making at the University of Illinois. Mathematics department papers show that the Illinois department chairman's recommended promotion met with initial resistance from the dean after which several senior members of her department wrote in her behalf. She and her teaching were given high praise. It was noted that she had done much work with the teaching of teachers; also that she "has talent for imparting enthusiasm for mathematics ... whether it be elementary freshman mathematics, calculus for honors students, advanced calculus for engineers, or arithmetic for teachers." Other specific comments were: "I believe that Professor Pepper's promotion to an associate professorship is long overdue.... She succeeds in bringing the spirit of mathematical creativity into whatever course the department assigns her to teach." "Other members of our staff younger and of the opposite sex to that of Professor Pepper, have had immediate response to their requests for consideration." She was promoted to associate professor in 1960 and remained in that rank until she was forced to retire from the University of Illinois in 1965 because of her age, sixty-eight. She told her brother that she was not promoted to full professor because Olive Hazlett's illness had convinced the department that women were too frail to become full professors.

From 1965 to 1970, after her retirement from Illinois, Pepper was at Notre Dame University in Nelson, British Columbia, as associate professor and department head. Her brother reported that she was asked to come to Notre Dame by a student she had taught at Seattle College twenty years earlier. She was hired on a year-to-year basis, and her appointment was not renewed the year she turned seventy-three.

According to her brother, Echo Pepper was about five feet tall and weighed no more than a hundred pounds. She was completely ambidextrous and could write with both hands simultaneously. She was a pacifist and an Independent but more Republican than Democrat. She was raised as a "high" Episcopalian but became a Roman Catholic when she was young. About 1940 she became an oblate of the Order of St. Benedict, a lay position, having become involved with the Benedictines through St. Johns University in Collegeville, Minnesota. She was also a member of the Catholic Daughters of America.

After her second forced retirement, Pepper moved to the Washington, D.C., area to live in an adult community in Silver Spring, Maryland, near her brother. When she was past eighty, she moved to the Retirement Living Center at Carroll Manor, a Carmelite home. She died in the Carroll Manor Nursing Home in Hyattsville, Maryland, in January 1979 at age eighty-one after numerous strokes. Pepper was buried at Evergreen-Washelli cemetery in Seattle.

Organizational affiliations: AMS, MAA, London Math. Soc., AAAS, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1922 On multiplicative and enumerative properties of numerical functions. MS thesis, University of Washington. See also **1923**.

1925 Theory of algebras over a quasi-field. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series.* 4:27–30.

Publications:

1923 On multiplicative and enumerative properties of numerical functions. *Tôhoku Math. J.* 22:138–52. Published version of MS thesis. Review: *JFM* 48.1159.04 (R. Fueter).

1927 Asymptotic expression for the probability of trials connected in a chain. *Ann. of Math.* 2nd ser., 28:318–26. Reviews: *JFM* 53.0500.01 (A. Basch); *Rev. semestr. publ. math.* 34, pt. 1: 62 (W. A. Wythoff).

1928 On continuous functions without a derivative. *Fund. Math.* 12:244–53. Review: *JFM* 54.0275.02 (G. Feigl).

1929a On density distribution in stellar space. *Proc. London Math. Soc.* 2nd ser., 29:98–110. Review: *JFM* 55.1218.06 (W. Fender). Presented to the London Math. Soc., 14 Jun 1928.

1929b On Poisson's series of trials. *Math. Ann.* 101:375–380. Reviews: *JFM* 55.0914.01 (E. Tornier); *Rev. semestr. publ. math.* 35:71 (J. C. Kluyver).

References to: AmMSc 5–8, 9P–11P; AmMWSc 12P; AmWom 1935–40.

Other sources: PhD dissertation vita 1925; Owens questionnaires 1937, 1940; author's conversation with Vincent A. Pepper 1992; University of Chicago Archives, Special Collections Research Center; University of Illinois Department of Mathematics records; Constance Reid, *The Search for E. T. Bell: Also Known as John Taine* (Washington, DC: Mathematical Association of America, 1993); US Census 1900, 1910, 1920, 1930 WA; Maryland death certificate.

Last modified: August 6, 2009.

PETERS, Ruth M. December 11, 1906–May 12, 1961.
Bryn Mawr College (BA 1928, MA 1931), Radcliffe College (PhD 1933).

Ruth Margaret Peters was born in Gettysburg, Pennsylvania, the second of three children of Julia (Clutz) (1881–1963), a native of Maryland, and Robert John Peters (b. ca. 1871) of Pennsylvania. Julia Clutz was the daughter of the president (1889–1904) of Midland College in Aitchison, Kansas, where Robert J. Peters was a professor of English 1904–09. Julia Clutz received a bachelor's degree from Midland College in 1899, graduated from Goucher College in 1901, and, it appears, received an MA in 1904 from a different school.

Ruth Peters' brother, Robert, was a year older than she; her sister, Mary (1909–1997), was two and a half years younger. In 1910 the family was living in Pittsburgh, where her father was a college professor. Her parents had been married for five years, this being the second marriage for her father. In the 1920 census her father's occupation was listed as educational secretary; in 1930 he was called an executive with the US government.

Peters attended grade schools in Gettysburg and prepared for college at the Seiler School, a private school in Harrisburg, Pennsylvania. The family was living in New Cumberland, near Harrisburg, when Peters was in college. As an undergraduate mathematics major at Bryn Mawr, she held the Elizabeth Wilson White memorial scholarship her senior year. She graduated in 1928; the following year, 1928–29, Peters worked for the traffic engineering department of the Bell Telephone Company doing trunk analysis.

In 1929 Peters returned to Bryn Mawr for graduate work in mathematics and physics and studied there as a scholar of the Society of Pennsylvania Women in New York 1929–30 and as a fellow in mathematics 1930–31. Peters received her master's degree in 1931, a year after her younger sister, Mary, received her bachelor's degree from Bryn Mawr and the same year that Mary received her master's degree in chemistry from Radcliffe College.

In 1931 Ruth Peters entered Radcliffe College to begin her doctoral work. While there she wrote a minor thesis on equations of the fifth degree. She completed all her requirements, including her dissertation in Riemannian geometry, and received her PhD in 1933. Her first position after receiving her PhD in the depth of the Depression was as a personnel assistant doing job analysis for the Pennsylvania Emergency Relief Board.

The following year Peters went to Judson College, a small Baptist women's college in Marion, Alabama, where she was assistant professor 1934–35 and associate professor 1935–36. She then took a position as professor of mathematics and physics at Lake Erie College, also a women's college, in Painesville, Ohio. She was there 1936–43 and 1945–47. According to an item in the *Monthly* in 1943, she was granted a leave of absence from Lake Erie College in order to serve as a research mathematician with the applied mathematics group at Columbia University. Sometime prior to June 1943 she submitted a general application for employment to the Bryn Mawr alumnae office listing her address as Lake Erie College; on the form she noted that she was then working as an assistant physicist for the National Defense Research Council at Harvard and was seeking employment in the Boston area teaching mathematics or doing work in physics or statistics. Peters reported later that she was a technical aide in airborne fire control, guided missiles, and rockets for the Office of

Scientific Research and Development at the Massachusetts Institute of Technology 1943–45 and that she did research on the theory of errors in bombing.

Two years after returning to Lake Erie College, Peters went to St. Lawrence University in Canton, New York. She was associate professor 1947–55 and professor 1955–58. While there she served as department chairman for two years. She also held a National Science Foundation faculty fellowship at Harvard the second semester 1957–58 and was president of the New York Lambda chapter of Phi Beta Kappa in the late 1950s. In the mid-1950s, Peters indicated that she was a member of the League of Women Voters and was interested in oil painting and gardening.

In 1958 Peters went to the University of New Hampshire as associate professor. She was there only two years before she had to take a medical leave in October 1960. Peters' mother had lived with her from at least 1953, before Peters became ill. Ruth Peters then moved to her sister's home in Belmont, Massachusetts. She died from cancer in a Boston hospital at age fifty-four in 1961 and was survived by her mother, sister, and brother.

Three years after Peters' death, Mary Fieser, her sister and coauthor with Louis F. Fieser of standard texts in organic chemistry, established an award at the University of New Hampshire in her memory. The award description notes that one of Ruth Peters' prime interests was discovering outstanding students and encouraging their development. The Dr. Ruth Peters Memorial Award is given each year to a student majoring in mathematics who has a deep interest in mathematics and shows signs of creativity.

Organizational affiliations: AMS, MAA, AAUP, Phi Beta Kappa, Pi Mu Epsilon.

Thesis and dissertation:
n.d. Equations of the fifth degree. Minor thesis, Radcliffe College. Also listed as "Equations of elasticity."
1933 Parallelism and equidistance in Riemannian geometry. PhD dissertation, Radcliffe College, directed by William Caspar Graustein. Summary: *Radcliffe summaries of theses.* 1935: 115–19. See also **1935**.

Publications:
1935 Parallelism and equidistance in Riemannian geometry. *Amer. J. Math.* 57:103–11. Published version of PhD dissertation. Reviews: *JFM* 61.0800.02 (L. Berwald); *Zbl* 011.08202 (S. Cohn-Vossen).
1937 Parallelism and equidistance of congruences of curves of orthogonal n-tuples. *Amer. J. Math.* 59:564–74. Reviews: *JFM* 63.1243.03 (E. Bortolotti); *Zbl* 017.42204 (D. J. Struik).

References to: AmMSc 7–8, 9P–10P; WhoAmW 1.
"Ruth Peters, 54, a Mathematician." *New York Times*, 13 May 1961.

Other sources: Owens questionnaires 1937, 1940; Bryn Mawr College Archives; communications with Goucher College Archives and with Midland Lutheran College Archives; communication with David Burton, former colleague at the University of New Hampshire; "Feiser, Mary Peters" in *Notable American Women: A Biographical Dictionary, Completing the Twentieth Century*, ed. Susan Ware, 206–8 (Cambridge, MA: Belknap Press of Harvard University Press, 2004); US Census 1910, 1920, 1930 PA.

Last modified: January 22, 2016.

PIXLEY, Emily (Chandler). August 19, 1904–August 28, 2000.
Randolph-Macon Woman's College (BA 1926), University of Chicago (MS 1927, PhD 1931).

Emily McCoy Chandler was born in Knoxville, Tennessee, the daughter of Mayme (McCoy) (b. ca. 1879) and David Sanders Chandler (b. 1876), both Tennessee natives. The 1920 census lists three daughters: Emily, age fifteen; Dorothy A., age ten; and Carlotta B., age two months. Her father was a district passenger agent with the railroad.

Chandler attended primary and secondary school in the Knoxville public school system and graduated from Knoxville High School in 1922. She then entered Randolph-Macon Woman's College (now Randolph College) in Lynchburg, Virginia, where she majored in psychology and mathematics and minored in English. One of her teachers was Gillie Larew, who had been a mathematics faculty member at Randolph-Macon since 1903 and who later served as a personal reference for Chandler. While at Randolph-Macon, Chandler was active in student government, the YWCA, and the Inter-racial Committee. Immediately after her graduation, Chandler entered graduate school at the University of Chicago in the summer quarter of 1926. She attended four straight quarters before receiving her master's degree in 1927 with a thesis in analysis written under the direction of L. M. Graves.

After receiving her master's degree, Chandler took a position as instructor and acting head of the mathematics department at Saint Xavier College for Women (now Saint Xavier University) in Chicago while she continued her graduate work part time at the University of Chicago. After four years she finished the work for her doctorate, having studied with L. E. Dickson and Mayme I. Logsdon, among others. She wrote her dissertation in number theory under Dickson and received the PhD in 1931.

A fellow graduate student at Chicago was Henry Howes Pixley, who also earned a master's degree in mathematics in 1927 and a doctorate in 1931 as a student of Graves. Pixley was born in Skaneateles, New York, on July 18, 1902, received most of his elementary and secondary education in Michigan, graduated from high school in Florida, and received his BA degree in 1923 and MA degree in 1924 from John B. Stetson University in Deland, Florida. Between 1924 and 1931, the date of his doctorate from Chicago, Henry Pixley held instructorships at Georgia School of Technology (now Georgia Institute of Technology), Rutgers University, Bryn Mawr College, and the College of the City of Detroit. Emily Chandler and Henry Pixley were married on September 8, 1931.

Although inquires for a position in Detroit for Emily Chandler were made in the spring of 1931, both Pixleys retained their positions after their marriage, she at Saint Xavier in Chicago, where she continued as professor and department chairman 1930–36, and he at the College of the City of Detroit as instructor 1930–34. In 1933–34 Emily and Henry Pixley had leaves of absence from their academic positions and worked in areas having to do with labor productivity and mathematical economics for the National Recovery Administration. Three of the tables she prepared for the NRA appeared in a 1935 article, "Economic theory of the shorter work week," by Charles F. Roos (*Econometrica* 3:21–39).

In 1933 the College of the City of Detroit united with other public colleges in Detroit, and in 1934 the institution was named Wayne University; it was renamed

Wayne State University in 1956. Henry Pixley remained at Wayne as assistant professor 1934–37 and associate professor from 1937 until his retirement in 1972. After 1945 his responsibilities were largely administrative; he was assistant dean of the College of Liberal Arts 1945–47; director of admissions, records, and registration 1947–53; and associate dean of administration 1953–69 before returning to the classroom as associate professor.

In 1936 Emily Pixley began an association of a dozen years with Wayne University. She was hired in September 1936 as a special instructor with an hourly salary. She worked as a special instructor part time 1936–42 and full time 1942–47. Also, during her first years there, the Pixleys had three children: Dorothy Anne, born in August 1937; David Chandler, born in June 1939; and Richard Henry, born in June 1942.

In September 1947 the title of Emily Pixley's position changed from special instructor to regular substitute assistant professor with a teaching load of sixteen hours per week. In April 1948, in a memo from the mathematics department chairman to the dean, it was noted that there had been "progress in the matter of adherence to the university policy relative to employment of man and wife," a policy that had been ignored for three years because of the difficulty in hiring "qualified personnel." He also wrote that "while the quality of teaching will be lowered somewhat by making Mrs. Borgman and Mrs. Pixley the first to go, university policy demands that this be done, and I have already made clear to those affected that this will require the termination of their services in June 1949" (Alfred L. Nelson, Mathematics Department, to Dean C. B. Hilberry, April 23, 1948, University Archives, Wayne State University).

Emily Pixley did not wait for the university anti-nepotism policy to be satisfied by the termination of her services in 1949, but found employment at the University of Detroit (now University of Detroit Mercy) for the academic year 1948–49. She spent the remaining twenty-five years of her career there: as assistant professor 1948–51, associate professor 1951–56, and professor from 1956 until her retirement in 1973 as professor emeritus. She also served as acting department chair in the summers 1963–69 and in the academic year 1968–69. One of her sons reported for her obituary in the *Detroit Free Press* that "she was never formally named chair because of her gender."

In the late 1940s Emily Pixley indicated that her church preference was Congregational and that she had traveled in Alaska, Europe, and the United States. She also noted that she read French, German, and Italian. She had recently served as chairman of the faculty wives scholarship committee at Wayne and as president of the Randolph-Macon alumnae, presumably in Detroit.

Henry Pixley died in Detroit on October 9, 1985, at age eighty-three. Emily Pixley remained in the metropolitan Detroit area and died on August 28, 2000, at age ninety-six, in Presbyterian Village Redford in Redford Township, Michigan. She was survived by her two sons, a sister, eight grandchildren, and five great-grandchildren.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1927 [Chandler, E. M.] The elementary transcendental functions in terms of integrals. MS thesis, University of Chicago, directed by Lawrence Murray Graves. Typescript.

1931 [Chandler, E. M.] Waring's theorem for fourth powers. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, 1933, distributed by the University of Chicago Libraries. Review: *JFM* 59.0950.04 (F. Behrend).

References to: AmMSc 6-7, 10P–11P; AmMWSc 12P–13P, 14–21; WhoAmW 8–9.
Oguntoyinbo, Lekan. "Emily Pixley: Pioneering Math Professor in Detroit." (Obituary) *Detroit Free Press*, 31 Aug 2000.
"Emily Chandler Pixley, Chaired U-D's Mathematics Dept." (Obituary) *Detroit News*, 1 Sep 2000.

Other sources: MS thesis vita 1927; PhD dissertation vita 1933; Owens questionnaire 1937; University of Chicago Archives; communication with Wayne State University Archives; "WSU dean was a solver of problems," (Henry H. Pixley obituary) *Detroit Free Press*, 12 Oct 1985; US Census 1920, 1930 TN.

Last modified: December 14, 2008.

PORTER, Goldie (Horton). September 4, 1887–May 11, 1972.
University of Texas (BA 1908, PhD 1916), Smith College (MA 1910).

Goldie Printis Horton was the youngest of three surviving daughters, of four children born, of Colistia (Polk) (b. 1861), a Texas native, and John Thomas Horton (b. 1857), originally from Missouri. Her parents married in about 1881. She was born in 1887 in Athens, Texas, and her older sisters were Mary Coral (1882–1967) and Lillian Pearl (b. 1885). Her father was a physician, and in 1900 and 1910 the family lived in Quanah, Texas, just below the southeastern part of the Texas panhandle.

Goldie Horton attended public schools in Quanah before entering the University of Texas in 1904. While at the university she was secretary-treasurer of her senior class and was a member of the YWCA. She graduated from Texas in 1908 before her twenty-first birthday. Her sister Pearl also received a BA from Texas in 1908 and was a public school teacher for some time after her graduation. Her eldest sister, Coral, studied at the University of Texas, taught school, married, and then earned a BA in 1924 and an MA in 1927 from Texas. Coral was a member of the University of Texas history department until her retirement in 1959 as assistant professor; she was associated with the Texas State Historical Association as corresponding secretary 1927-42 and corresponding secretary and treasurer 1942–67.

After receiving her bachelor's degree, Goldie Horton taught in the high school in Grandview, Texas, for a year before going to Smith College in Northampton, Massachusetts, with a fellowship in 1909. Records at Smith show that on October 11, 1909, Horton was made an honorary member of the mathematics club of the college, and on March 14, 1910, she gave a talk to the club on "Motion of Aggregate Points." She completed her master's thesis, "The development of analysis," in May 1910 and returned to Texas, where she taught at the high school in Amarillo for the next two years, 1910–12. Horton then studied at Bryn Mawr College as a fellow 1912–13.

In 1913 Goldie Horton was hired as a tutor at Texas. She also continued her graduate work and in 1916 completed the work for her PhD with a dissertation in analysis written under the direction of M. B. Porter; the approval sheet was also signed by H. J. Ettlinger and E. L. Dodd. Horton wrote in the dissertation: "I take the greatest pleasure in expressing my deep appreciation of the ready counsel and invaluable assistance given me by Professor Milton Brockett Porter, who for many years has been my teacher and friend and whose kind interest inspired me to continue my studies." This was the first doctoral degree in mathematics awarded at Texas. She was also the first woman to receive a PhD in any field at Texas.

Goldie Horton remained a tutor until 1917 when she was promoted to instructor in pure mathematics; in 1926 she was promoted to adjunct professor and in 1935 to assistant professor. According to Robert E. Greenwood's "In Memoriam," in the summer of 1921 she worked on the preparation of ballistic tables at the Aberdeen Proving Ground in Maryland. Her parents were still living in Quanah in 1920, but Goldie Horton and her widowed mother were living together in Austin in 1930.

In 1934 Horton and Milton Brockett Porter, her colleague and dissertation advisor of eighteen years earlier, had notes for a text reproduced by Edwards Brothers of Ann Arbor, Michigan, a company that often produced lithographs of lecture notes. On December 26 of that year she and Porter were married. This was the third marriage for M. B. Porter, who had been twice widowed. Milton Brockett

Porter was born on November 22, 1869, in Sherman, Texas. He received a BS in 1892 from the University of Texas and an MA in 1895 and a PhD in 1897 from Harvard University. After working as a private tutor in Texas and teaching at the University of Texas and at Yale University, he returned in 1902 as professor in pure mathematics to the University of Texas, where he remained until his retirement in 1945. M. B. Porter died in Austin on May 27, 1960.

Goldie Porter, still an assistant professor, stopped teaching full time and went on modified service in 1958. She continued part-time teaching until her retirement in 1966, when she was granted the title professor emeritus. Goldie Horton Porter was active in various organizations in Texas, particularly before she married. In 1919 she served as chair of the mathematics section of the Texas State Teachers' Association. She served as an officer of, gave talks to, and hosted parties for The Pentagram, the mathematics club at the university. Furthermore, she was a founder, in 1920, of the University of Texas chapter of Alpha Phi, a social sorority, and in 1923, of the Austin chapter of AAUW, which she also served as treasurer, secretary, and president. In the late 1930s she described herself as a Democrat and indicated interests in gardening and housekeeping.

In 1930 Goldie Horton and her mother, then almost seventy years old, had a house built in Austin where the Porters lived after their marriage. Greenwood noted:

> It soon became a misnomer to refer to the establishment as only a residence. It also became a library and a museum. Though both the Porters were avid readers they were obliged to curtail their acquisition of books only when they had no more place to store them. The Porters were lovers of music as well. Dr. M. B. Porter was an accomplished flutist, and Goldie served as his accompanist at the frequent informal musicales.
>
> An amateur astronomer, Professor M. B. Porter had a small telescope at the Porter Museum and a sundial placed in the gardens. Both the Porters were notable collectors – of cut glass, silver, oriental and European porcelains, oriental rugs, ivories, art glass, pictures, *objets d'art* in general, many of museum quality. After the Porters' heirs had selected various pieces from the estate, such a vast collection remained that a two-day auction attracted a large audience, for the Porter collection was well-known for its coverage and depth. Indeed, the spirited bidding for the rare Meissen figurines, the Daum, Tiffany, and Gallé glass, and the antique furniture demonstrated the Porters' acuteness as collectors. (Greenwood, "In Memoriam")

Goldie Porter remained in Austin and died in her home in 1972 at eighty-four. She was survived by two nieces, a nephew, and two stepdaughters and was buried in Austin Memorial Park. Her Austin home, the Horton-Porter House, was built in the Spanish Colonial Revival style and is listed in the National Register of Historic Places; it is on Windsor Road in the Old West Austin Historic District. Greenwood noted that among her bequests was one to the Texas governor's mansion of "a large Meissen group originally wrought in 1760 for German Royalty." She also endowed the Goldie Horton Porter Book Fund at Bryn Mawr College.

Organizational affiliations: AMS, MAA, AAUP, AAUW, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1910 [Horton, G. P.] The development of analysis. MA thesis, Smith College. Typescript.
1916 [Horton, G. P.] Functions of limited variation and Lebesgue integrals. PhD dissertation, University of Texas, directed by Milton Brockett Porter. Handwritten. See also **1918**.

Publications:
1916a [Horton, G.] Concerning roulettes. *Amer. Math. Monthly* 23:237–41. Review: *JFM* 46.0932.05 (G. Szegö).
1916b [Horton, G.] A note on the calculation of Euler's constant. *Amer. Math. Monthly* 23:73. Review: *JFM* 46.0347.07 (G. Szegö).
1918 [Horton, G. P.] Functions of limited variation and Lebesgue integrals. *Ann. of Math.* 2nd ser., 20:1–8. Published version of PhD dissertation. Review: *JFM* 46.0396.05 (M. Plancherel).
1919a [Horton, G. P.] The Pentagram during 1918–1919. *Texas Math. Teachers' Bull.* 4 (3): 39–40.
1919b [Horton, G. P.] Saving time and gaining efficiency in teaching trigonometry. *Texas Math. Teachers' Bull.* 4 (3): 11–14.
1919c [Horton, G. P.] Topics and references for the high school mathematics club. *Texas Math. Teachers' Bull.* 5 (1): 33–34.
1920 [Horton, G. P.] Mathematics at the Houston meeting of the State Teachers Association. *Texas Math. Teachers' Bull.* 5 (2): 31–32.
1934 [Horton, G. P.] with M. B. Porter. *Plane and Solid Geometry*. Ann Arbor, MI: Edwards Brothers.

Abstract not listed above:
1925 [Horton, G. P.] Darboux integrals. *Amer. Math. Monthly* 32:161 #2. Presented to the MAA, San Antonio, TX, 28 Nov 1924.

References to: AmMSc 7–8, 9P–11P; AmWom 1935–40; BioWMath; WhoAmW 3–4.
"Dr. Porter Succumbs at Home." *Austin American*, 12 May 1972.
Greenwood, Robert E. "In Memoriam: Mrs. Goldie Horton Porter." Filed 27 Nov 1972. Documents and Minutes of the General Faculty, The Center for American History, University of Texas at Austin. Typescript.

Other sources: Center for Research Libraries College Catalog Collection; Smith College Archives; University of Texas Perry-Castañeda Library; communication with University of Texas Archives; Lewis, "The Building of the University of Texas Mathematics Faculty"; NatCAB 49 (Porter, Milton Brockett); US Census 1900, 1910, 1920, 1930 TX.

Last modified: July 20, 2009.

PRICE, Irene. January 16, 1902–March 13, 1999.
Indiana University (BA 1926, MA 1927, PhD 1932).

Irene Price was born in Parr, Indiana, the second of five children of Ruth Elizabeth (Schroer) (1875–1954), originally of Zanesville, Ohio, and William Edward Price (1874–1930), born near Rensselaer, Indiana. Her mother attended school through the eighth grade and her father through about the sixth grade. Her parents, who married September 24, 1899, farmed in northwestern Indiana. Her older sister, Lilly (1900–1932), finished high school and taught for four years before her marriage. Her next younger sister, Gladys (1903–1976), completed a master's degree and was a biology teacher in Macon, Georgia, until her marriage. Her brother, Lawson (1908–1984), was an electrical engineer and then a farmer before his retirement, while her youngest sister, Esther (1912–2006), finished high school, married, and was a beautician.

Irene Price attended high school in Rensselaer, Indiana, 1915–19 before teaching grade school in Rensselaer for the next four years. During the summer of 1921 she studied at Indiana State Normal School (now Indiana State University) in Terre Haute.

Price recalled many years later that she entered Indiana University thinking she knew what she wanted to do. "Mathematics was always my favorite subject and I just intended that eventually teaching high school was my goal, but when I got in college I had some very good professors who encouraged me to go on and get a doctorate" (Smithsonian meeting tapes 1981). She completed the work for her bachelor's degree at Indiana in 1926 and stayed there the next three years for her graduate work in mathematics. She was a part-time instructor at Indiana 1926–29, was awarded a Clara Javen Goodbody scholarship in 1927, and was an instructor in the extension division 1927–29. She earned her master's degree in 1927, and an article with the same title as that of her master's thesis appeared in the *American Mathematical Monthly* the following year. While at Indiana she also worked on a tables computation project directed by Harold T. Davis, which was published as a two-volume work in 1933 and 1935. Price's doctorate was granted by Indiana in 1932. At Indiana she was a member of Pi Lambda Theta and Kappa Delta Pi, education honor societies; Sigma Xi; and Phi Beta Sigma, a service fraternity.

After her graduate studies, Price had three somewhat distinct careers. She was a college professor for about fifteen years, then worked as a statistician for the US Air Force for a dozen years, and finally was self-employed as a real estate agent for more than forty years. From 1929 to 1944 she was professor of mathematics at Oshkosh Teachers College (now University of Wisconsin Oshkosh). She went to Oshkosh the year after the arrival of May Beenken, the department head. While there Price taught the full range of mathematics courses offered by the college. In addition to maintaining memberships in various professional associations, she was active in the Wisconsin Section of the MAA and served on the program committee 1934–35 and 1939–40 and as chairman of the section 1941–42. She also belonged to the Oshkosh Education Association, for which she served as treasurer for several years after 1936, and the AAUW, for which she was president of the Oshkosh branch 1942–43.

In 1944 Price began her employment as a statistician for the Headquarters of the Air Materiel Command at Wright-Patterson Air Force Base in Ohio. While

in Ohio she coauthored a technical report and taught several evening courses in college mathematics in Dayton and at Miami University in nearby Oxford. Price remained in Ohio until 1949, when she moved to Alamogordo, New Mexico, where she directed mathematical research on guided missiles at the Holloman Air Force Base until 1953. She then took a position as a mathematician at White Sands Proving Ground where she stayed until 1956. While in these positions she authored, sometimes jointly, technical reports about data reduction. These reports dealt with the recording of measurements made by sophisticated instruments such as miniature infrared analyzers (MIRAN) and firing error indicators (FEI). According to her obituary, "she was charged with developing mathematical theories of tracking the speed, path, and trajectory of missiles being tested at White Sands Missile Range." She also gave talks about this and related work in the early 1950s at conferences held at Wright-Patterson Air Force Base, Holloman Air Force Base, and White Sands Proving Ground.

In 1956 Irene Price became owner of Price Realty and after 1956 was engaged in a number of professional activities associated with this business. She held various offices in the Alamogordo Board of Realtors, was district director of the New Mexico Realtors Association 1962–64, and was a member of the National Association of Realtors. In 1971 she taught a college course in real estate practice to retiring military at Holloman Air Force Base, and in 1978 she was named Alamogordo Realtor of the Year by the Alamogordo Board of Realtors. She retired from the real estate business in January 1998 at ninety-six.

In about 1940 Price described her hobbies as going on picnics and gardening. In 1981 Price reported other interests; she wrote that she was affiliated with the Christian Church and was a member of the John Birch Society, Business and Professional Women (treasurer 1957), the Republican Women's Club 1963–65, Women Aware, and the Alamogordo Chamber of Commerce. She was also a trustee of the Betty Dare Foundation and a member of the advisory board of the Betty Dare Good Samaritan Center, a nursing home.

Irene Price was ninety-seven when she died at the Aristocrat Assisted Living Center in Alamogordo, New Mexico, in 1999. She was cremated and a memorial service was celebrated at a Christian Church in Alamogordo. She was survived by a sister, a cousin, and nieces and nephews.

Organizational affiliations: AMS, MAA, ASA, Econometric Soc., AAUW, Sigma Xi.

Thesis and dissertation:

1927 Laplace's calculus of generatrix functions. MA thesis, Indiana University.

1932 On a certain type of polynomials. PhD dissertation, Indiana University, directed by Kenneth Powers Williams and Harold Thayer Davis. Printed version, 1933, Edwards Brothers, Ann Arbor, MI.

Publications:

1928 Laplace's calculus of generatrix functions. *Amer. Math. Monthly* 35:228–35. Review: *Rev. semestr. publ. math.* 34, pt. 1: 30 (R. C. Archibald). Presented to the MAA, Greencastle, IN, 30 Apr 1927; abstract: *Amer. Math. Monthly* 34:344 #4.

1933–35 (Contributor) *Tables of the Higher Mathematical Functions*, 2 vols., compiled by Harold T. Davis. Bloomington, IN: The Principia Press. Volume 1 (1933): Table 6, The reciprocal gamma function, 269–73; Tables 7 and 8, The psi function, 291–311 and 313–33. Reviews of vol. 1: *J. Amer. Stat. Assoc.* 29:235–36 (T. Abel); *Quarterly Rev. Biol.* 10: 117. Volume 2 (1935): with Anna Lescisin and Marion B. Shelley, Gram polynomials: Table 40 the straight line, 325–29; Table 41 the parabola, 331–35; Table 42 the cubic,

337–39; Table 43 the quartic, 341–43; Table 44 the quintic, 345–47; Table 45 the sextic, 349–53; Table 46 the septimic, 355–59. Reviews of vol. 2: *Amer. Math. Monthly* 43:486 (P. Franklin); *J. Amer. Stat. Assoc.* 31:759–60 (J. D. Elder).
1942 I doubt it–a mathematical card game. *Amer. Math. Monthly* 49:117.

Technical reports:
1948 with M. A. Schneiderman. Use of sampling for verifying IBM cards. Project CA-M-14, Analysis Office, Comptroller's Department, Headquarters of the Air Materiel Command, Dayton, OH. April. Restricted distribution.
1950a Location of target boards for cinetheodolites at Holloman Air Force Base, N.M. Holloman Air Force Base, NM.
1950b The rectangular coordinate system for Holloman Air Force Base. Holloman Air Force Base, NM. Restricted distribution.
1952a with C. A. Bodwell. A reduction procedure for the Douglas FEI equipment. Report no. MTHT 213, Holloman Air Force Base, NM, May. Restricted distribution. Also appeared in *J. Data Reduction*, June 1952, White Sands Proving Ground.
1952b with W. G. Holland. Determination of yaw and pitch of a missile from photographs. Report no. 2, Technical Staff, Holloman Air Force Base, NM. Restricted distribution.
1953a with C. A. Bodwell. Accuracy requirements of timing for cinetheodolites. White Sands Proving Ground, NM. December. Restricted distribution.
1953b with C. A. Bodwell. Theoretical evaluation of the capabilities of the Miran instrumentation system. Holloman Air Force Base, NM. February. Restricted distribution.
1955 with C. A. Bodwell. Tables of the derivatives of the orthogonal polynomials. White Sands Proving Ground, NM. May. Restricted distribution.

Abstract not listed above:
1935 Concerning a special type of polynomial. *Amer. Math. Monthly* 42:471 #2. Presented to the MAA, Milwaukee, 4 May 1935.

References to: AmMSc 6-8, 9P; AmWom 1935–40.
"Irene Price, 97, Alamogordoan." (Obituary) *Alamogordo Daily News*, 16 Mar 1999.

Other sources: Owens questionnaires 1937, 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; communications with Indiana University Alumni Association and Alamogordo (NM) Public Library; US Census 1900, 1910, 1920, 1930 IN, 1930 WI; SSDI.

Last modified: March 8, 2009.

QUINN, Grace (Shover). December 20, 1906–February 4, 1998.
Ohio State University (BA 1926, BS 1926, MA 1927, PhD 1931).

Carolyn Grace Shover was the second of two daughters of Margaret Seeds (1859–1944) and Cyrus F. Shover (1857–1939), both natives of Ohio. She was born in Grove City, Ohio, just outside Columbus. Her parents attended rural schools and married in about 1892. Her mother, later described by Quinn as a homemaker who was an expert seamstress, held a teacher's certificate, while her father was a carpenter and was in the lumber business. Her older sister, (Rebekah) Ruth Shover (1894–1975), was also born in Grove City. Ruth Shover later earned a bachelor's degree in education from Ohio State University and a master's degree from what is now Case Western Reserve University, and was a high school teacher. The family was living in Columbus, Ohio, by 1900.

Grace Shover attended public schools in Columbus from 1912 to 1922, when she entered Ohio State University at age sixteen as a commuter. She graduated in 1926, having earned a BA with honors and a BS in education. She was a member of Pi Lambda Theta, an education honorary association. Shover remained at Ohio State and earned a master's degree in 1927, after having served as an assistant in psychology during 1926–27. Her master's thesis was on scoring methods in college reading tests. She continued her work at Ohio State with a University scholarship in mathematics 1927–29; she also studied at the University of Chicago during the summer of 1928.

Shover taught mathematics for the next four years while also completing her graduate work in mathematics. She was an instructor at Connecticut College for Women 1929–33. During this period, in 1931, she received a PhD in mathematics from Ohio State University, with a dissertation in the area of number theory in the context of a linear associative algebra, written under the direction of C. C. MacDuffee. During 1933–34 she worked at the Federal Reserve Bank in Cleveland, Ohio.

In the fall of 1934 Grace Shover was one of four women who was at Bryn Mawr College on a scholarship or fellowship to study with Emmy Noether, who had come to Bryn Mawr from Germany the previous fall. The others were Marie Weiss (PhD 1928 Stanford), Olga Taussky (PhD 1930 University of Vienna), and Ruth Stauffer (McKee), who was a doctoral student at Bryn Mawr and who would receive her degree the following June. Shover had an Emmy Noether fellowship, which paid for her room, board, and tuition. Her account of some events of the year at Bryn Mawr and especially of the sudden death of Noether in April 1935 was presented at a 1982 AWM symposium on Noether and published as **1983**. During the next year, 1935–36, Shover was a teacher at the Shipley School in Bryn Mawr, a position she had taken the previous winter with the intention of continuing her studies with Noether. She said in 1982, "Unfortunately, my plans were shattered by her untimely death" (**1983**, 140).

In the summer of 1936 Shover attended the International Mathematical Congress in Oslo. Before the Congress she traveled to Göttingen and attended lectures by Helmut Hasse. She left Göttingen early to assist Anna Pell Wheeler, who was in a wheelchair after having fallen in Hamburg, in her travels from Copenhagen to Oslo. Shover had planned to travel after the Congress with a group led by Mayme

Logsdon. However, the group left before the Congress ended, and Shover joined them a day late in order to hear a talk by Olga Taussky.

Shover was an instructor at the New York College for Teachers (now State University of New York at Albany) for the year 1936–37 and then at Carleton College in Minnesota for five years, 1937–42. In June 1940 she wrote to Helen Owens that teaching "does not leave much time for original work. I have 3 papers in the fire and wish to finish them this summer" (Owens Papers). It appears that one of these papers was published the following year.

On June 9, 1942, in Cleveland, Ohio, Grace Shover married Robert Byron Quinn, who had been an instructor of physics at Carleton the previous three years. Robert Quinn, born on February 6, 1907, in Valparaiso, Indiana, received his bachelor's degree and master's degree from Indiana University in 1929 and 1930, respectively, and his doctorate in physics from the University of Chicago in 1941. After their marriage the Quinns moved to Washington, D.C., where from 1942 to 1945 Robert Quinn was a staff member and project engineer for the US Naval Research Laboratory. In 1942 Grace Quinn was a cryptanalyst for the US Navy, and from 1943 to 1945 she was a research assistant for the National Defense Research Committee. From 1942 to 1944 she was also a part-time lecturer at George Washington University.

Robert Quinn continued his professional work with the US Naval Research Laboratory as unit head 1945-48 while also an instructor at the University of Maryland 1945–46. He then worked in the navy's Bureau of Ordnance, Bureau of Naval Weapons, and the Naval Air Systems Command before his retirement in 1970. He was a staff member and mathematician in evaluation and analysis with the Bureau of Ordnance 1948–60, was group head in Weapons System Analysis with the Bureau of Naval Weapons 1960–66, and was branch head of the Naval Air Systems Command 1966–70.

The Quinns had two daughters, both born in Washington, D.C.: Margaret Edith in May 1946, and Carolyn Roberta in August 1949. Margaret Quinn later earned a bachelor's degree in mathematics and computer science from Iowa State University and a master's degree in computer science from Rutgers University; in 1981 she had completed the course work for her PhD and was working as a computer scientist for Bell Telephone Laboratories in Highland Park, New Jersey. Carolyn Roberta Quinn earned a bachelor's degree in English Literature from Ripon College and a certificate from the Morven Park International Equestrian Institute in Leesburg, Virginia, and was working as an equestrian in 1981.

Grace Quinn interrupted her career for just over a decade while the children were young before resuming full-time teaching in 1956 at American University in Washington, D.C. She spent the next fourteen years there, first as assistant professor, then as associate professor, and finally as professor from 1963 until her retirement in 1970. She continued as an adjunct professor for a year after her retirement. Her teaching at American University included the complete range of undergraduate courses as well as modern algebra and matrix theory at the graduate level. Quinn also directed several master's theses while at American University. She was a member of Phi Kappa Phi, an honor society for scholarship when she was at American.

In her 1981 Smithsonian questionnaire, Quinn described her religious affiliation as Congregational since 1928. She described one of her hobbies as playing the piano

and noted that she took piano and belonged to a group with similar interests. She was also interested in needlework, sewing (had done tailoring including a winter coat), and some gardening. At that time she was treasurer of the American University Women's Association; was secretary of the Women's Guild at her church, the Westmoreland Congregational Church in Bethesda; was on the executive board of the Bethesda Garden Club; and was vice president of a social club. She also noted that earlier she had been a Republican, later a Democrat, and most recently a registered Republican. Other activities mentioned later were membership in the Appalachian Trail Club and volunteer work for Meals on Wheels.

In July 1991 the Quinns moved to Foxdale Village, a Quaker retirement community in State College, Pennsylvania. There they belonged to the Faith United Church. Less than two years later, on March 21, 1993, Robert B. Quinn was in an automobile accident; after nearly seven months in a coma he died on October 3. According to the *Washington Post* obituary, he had been a passenger in a car that was hit broadside when another car ran a stop sign. In February 1998 Grace Quinn died at ninety-one of a heart ailment in Foxdale Village in State College, Pennsylvania. She was survived by their two daughters and a grandchild. Inurnment was at Graceland Cemetery in Valparaiso, Indiana, where her husband was buried.

Organizational affiliations: AMS, MAA, AWM, AAUW, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1927 [Shover, G.] Differential scoring methods in college reading tests. MA thesis, Ohio State University.

1931 [Shover, G.] On the class number and ideal multiplication in a rational linear associative algebra. PhD dissertation, Ohio State University, directed by Cyrus Colton MacDuffee. Typescript. Abstract: *Abstracts of doctors' dissertations. The Graduate School, Ohio State University.* 8:142–47. See also **1933**.

Publications:

1931 [Shover, G.] with C. C. MacDuffee. Ideal multiplication in a linear algebra. *Bull. Amer. Math. Soc.* 37:434–38. Presented to the AMS, Cleveland, OH, 30 Dec 1930; abstract: *Bull. Amer. Math. Soc.* 36:806 #424. Reviews: *JFM* 57.0164.02 (W. Specht); *Zbl* 002.01101 (G. Köthe).

1933 [Shover, G.] Class number in a linear associative algebra. *Bull. Amer. Math. Soc.* 39:610–14. Published version of PhD dissertation. Presented to the AMS, Columbus, OH, 28 Nov 1931; abstract: *Bull. Amer. Math. Soc.* 37:829 #388. Reviews: *JFM* 59.0165.01 (A. Scholz); *Zbl* 007.39503 (C. C. MacDuffee).

1941 [Shover, G.] On roots of unity. *Natl. Math. Mag.* 15:232–33.

1983 with R. S. McKee, M. Lehr, and O. Taussky. Emmy Noether in Bryn Mawr. In *Emmy Noether in Bryn Mawr,* ed. B. Srinivasan and J. Sally, 139–146. New York: Springer-Verlag. Presented as part of "Emmy Noether at Erlangen, Göttingen, and Bryn Mawr," panel discussion at AWM Symposium in Honor of Emmy Noether's 100th Birthday, Bryn Mawr, PA, 18 Mar 1982. Review: *Zbl* 557.01012 (I. Schneider).

Abstracts not listed above:

1936 [Shover, G.] Number theory in a hypercomplex system. *Bull. Amer. Math. Soc.* 42:336. Presented to a meeting of the AMS, New York City, April 10–11.

1938 [Shover, G.] Operator isomorphism and equivalence of ideals. *Amer. Math. Monthly* 45:564 #3. Presented to the MAA, Collegeville, MN, May 14, 1938.

1939 [Shover, G.] On roots of unity. *Amer. Math. Monthly* 46:534 #8. Presented to the MAA, Northfield, MN, May 13, 1939, Carleton College.

References to: AmMSc 7, 10P–11P; AmMWSc 12P; WhoAmW 6.

"Obituary: Grace Shover Quinn." *State College Centre Daily Times*, 6 Feb 1998.
"Grace Shover Quinn, Mathematics Professor." *Washington Post*, 9 Feb 1998.

Other sources: PhD dissertation vita 1931; Owens questionnaires 1937, 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; Owens Papers; correspondence with author; conversations with authors; communication with Carleton College Archives; "Robert Byron Quinn," (Obituary) *Washington Post*, 6 Oct 1993; US Census 1900, 1910, 1920, 1930 OH; SSDI.

Last modified: December 21, 2010.

RAGSDALE, Virginia. December 13, 1870–June 4, 1945.
Guilford College (BS 1892), Bryn Mawr College (BA 1896, PhD 1904).

Virginia Ragsdale's parents, Emily Jane (Idol) (1841–1934) and Joseph Sinclair Ragsdale (1836–1903), natives of North Carolina, met and were married in 1866, after Joseph Ragsdale's return from fighting in the Civil War. There were four children of the marriage: Lula May, born in May 1867 and died in July 1867; (Julia) Ida (1868–1911); Virginia; and William Gannaway (1874–1929). Before her marriage Ragsdale's mother had attended various boarding schools and seminaries in Davidson County, North Carolina, and had taught in county public schools. Virginia Ragsdale was born in Jamestown, North Carolina, and her father, who owned and taught in a small private school early in his career, became a cotton manufacturer there and a prominent business man in the state.

Virginia Ragsdale first attended the private Flint Hill School in Jamestown. Other early education was obtained at the high school in Jamestown, at the Salem Female Academy, and by private study. She entered the Salem Female Academy as a junior and graduated as valedictorian with an extra diploma in piano in 1887, three years before the academy was renamed Salem College. In 1891 Ragsdale entered Guilford College in Greensboro, North Carolina, a coeducational institution that had been founded by the Society of Friends in 1837 and was known as the New Garden Boarding School until 1889. She graduated after one year with the class of 1892.

Upon graduation Ragsdale became the first person to receive Bryn Mawr College's newly established scholarship of four hundred dollars for being the Guilford woman with the highest scholastic average in her class. She spent the next five years at Bryn Mawr, and, although listed on the commencement program for 1904 as a graduate student in mathematics during that period, she actually studied for a second bachelor's degree that she received after four years in 1896. She completed her mathematics major by 1894 and then took post-major courses, that is, courses open to graduate students and undergraduates who had completed the major. These courses included the theory of functions, modern analytic geometry, and algebra. Before 1896 Ragsdale also took both major and minor courses in physics, minor courses in chemistry, and several German and Latin courses. She was elected European fellow for the class of 1896. Rather than immediately taking the fellowship, Ragsdale remained at Bryn Mawr for a year as both an assistant demonstrator in physics and as a graduate student in mathematics, taking post-major courses in higher plane curves and the theory of substitutions and auditing classes in German literature and Italian art. During that year, 1896–97, Ragsdale also participated in the newly formed Mathematical Journal Club, which met every other week to "receive reports on special topics and listen to outline accounts of interesting theories that do not naturally present themselves in the regular graduate work" (Bryn Mawr College, President's Report to the Board of Trustees 1896–97). In addition to the Bryn Mawr faculty and graduate students, both Frank Morley and E. W. Brown of Haverford presented papers at the journal club.

In March 1897 Charlotte Scott wrote to Felix Klein that she was "expecting to send two of [her] best students to Göttingen next year" (Felix Klein Nachlass XI, Universitätsarchiv Göttingen, Niedersächsische Staats- und Universitätsbibliothek).

Scott was referring to Ragsdale and Emilie Martin, an 1894 Bryn Mawr graduate in mathematics who also continued as a graduate student and who had also been awarded a fellowship to study in Europe. Ragsdale spent the year 1897–98 studying with Felix Klein and David Hilbert at the university in Göttingen. Both Ragsdale and Martin attended Klein's lectures on "Mechanik." When she returned from Germany Ragsdale did not immediately return to her formal graduate studies. Rather, she taught mathematics and science at the Bryn Mawr School in Baltimore for three years. It was not until she received in 1901 a fellowship awarded by the Baltimore Association for the Promotion of University Education of Women that Ragsdale returned to her studies. She studied at Bryn Mawr College 1901–03 and held the resident fellowship in mathematics in 1902–03. Ragsdale spoke to the Bryn Mawr journal club in December 1901 on the topic in algebraic geometry of her dissertation, which was directed by Charlotte A. Scott. She passed her examination for the PhD in September 1903, presenting as her major subject pure mathematics and as her minor subjects, physics and applied mathematics. Ragsdale's fellowships to Bryn Mawr ended in 1903, and she returned to teaching, this time in New York City at Dr. Sachs' School for Girls.

Ragsdale's PhD was conferred at the 1904 commencement. Her dissertation was not published until 1906, and this later date often appears as the date of her degree, including on Bryn Mawr College registers of alumnae. However, according to the secretary to the president of Bryn Mawr writing to Helen Owens in May 1936, "the dates of publication of the Bryn Mawr PhD Theses ... do not correspond in any regular way with the dates of conferring the degrees. Our general rule about publication is that the dissertation must be published within three years of the conferring of the degree" (Owens Papers).

In her dissertation Ragsdale proved that if all smooth sixth degree curves that have the maximum number of components arise in one of two ways, then certain restriction must hold on the number of ovals that can lie inside other ovals. What has become known as the "Ragsdale Conjecture" is that those restrictions always hold. This conjecture, never explicitly made by Ragsdale, is a generalization of the assertion David Hilbert made in 1891 that a smooth sixth degree curve that has a maximum number of components has at least one oval that is internal to another oval. The Ragsdale Conjecture was proved to be incorrect in 1979 by Oleg Viro and much has been written on it since then, including a 1996 expository article by Viro and Ilia Itenberg. Articles have continued to appear that address the characteristics of counterexamples to the conjecture.

Ragsdale continued to teach at Dr. Sachs' School for Girls until 1905 and then was at her home in North Carolina the following year. She resumed teaching and was head of the department of mathematics at the Baldwin School in Bryn Mawr 1906–11. During this time she maintained her connections with Bryn Mawr College; she spoke in the journal club, and from 1908 to 1910 she assisted Scott as a reader.

After the death of her sister in 1911, Ragsdale moved back to North Carolina to take a position at the State Normal and Industrial College in Greensboro, chartered twenty years earlier as the first state-supported school for the higher education of women in North Carolina. It was renamed North Carolina College for Women in 1919 and is now the University of North Carolina at Greensboro. During the years 1911 through 1926 she was instructor, associate professor, and then professor, and was head of the department from 1926 until 1928. She had taken a leave of absence

during the academic years 1913–14 and 1914–15, and spent most of that first year at the Highlands Camp Sanatorium, with a lung lesion, later determined not to be tubercular. In 1928, when she was not yet fifty-eight, Ragsdale retired to be with her mother and help manage a family farm. Helen Barton had joined the faculty at the college the previous year.

After her mother's death in 1934, Ragsdale had a house built on the Guilford College campus and became part of the Guilford community. She was a member of the executive committee of the Guilford College Alumni Association, belonged to the Friday Afternoon Book Club and the college Art Appreciation Club, and was a member of the Society of Friends at New Garden Friends Meeting. She was an avid and skilled gardener and was a devoted and much loved aunt to her thirteen surviving nieces and nephews. She was interested in genealogy and submitted a question to the *William and Mary Quarterly* that was published in 1930.

Virginia Ragsdale died at Wesley Long Hospital in Greensboro at age seventy-four in 1945 after several months of declining health. Interment was in Deep River Friends Meeting Historic Cemetery in nearby High Point, North Carolina. Her house was bequeathed to Guilford College and now stands as Ragsdale House, the home of the president of the college. In 1950 the Dr. Virginia Ragsdale Residence Hall was built on the campus of the University of North Carolina at Greensboro.

Organizational affiliations: AMS, MAA (charter member).

Dissertation:

1904 On the arrangement of the real branches of plane algebraic curves. PhD dissertation, Bryn Mawr College, directed by Charlotte Angas Scott. Printed version, 1906, Lord Baltimore Press, Baltimore, MD, reprinted from *Amer. J. Math.* 28:377–404.

Publication:

1906 On the arrangement of the real branches of plane algebraic curves. *Amer. J. Math.* 28:377–404. Published version of PhD dissertation. Reviews: *Bull. Sci. Math.* 2nd ser., 31, pt. 1: 266–67 (J. Tannery); *JFM* 37.0595.02 (E. Meyer); *Rev. semestr. publ. math.* 15, pt. 2: 2 (P. H. Schoute). Presented to the AMS, New York City, 29 Apr 1905; abstract: *Bull. Amer. Math. Soc.* 11:464 #4.

References to: BioWMath, WomWWA.

"Death Claims Dr. Ragsdale." unidentified newspaper clipping, 5 Jun 1945.

Gilbert, Dorothy Lloyd. "Virginia Ragsdale." *Guilford College Alumni Journal* 38 (December 1945): 4, 15.

Viro, Oleg. "Curves of Degree 7, Curves of Degree 8 and the Ragsdale Conjecture." English translation, *Soviet Math. Dokl.* 22 (1980): 301–6.

Itenberg, Ilia and Oleg Viro. "Patchworking Algebraic Curves Disproves the Ragsdale Conjecture." *Math. Intell.* 18 (4) (1996): 19–28.

Related manuscript material:

Ragsdale, Virginia, 1870–1945. Friends Historical Collection. The Library. Guilford College. Greensboro, North Carolina.

Other sources: PhD dissertation life 1906; Owens questionnaire 1940; Owens Papers; Bryn Mawr College Archives and correspondence with archivist; Universitätsarchiv Göttingen, Niedersächsische Staats- und Universitätsbibliothek (Felix Klein Nachlass) and correspondence with archivist; Guilford College Friends Historical Collection; University of North Carolina at Greensboro Archives; Kenschaft, "The students of Charlotte Angas Scott"; US Census 1870, 1880, 1900, 1910, 1920 NC, 1900 MD.

Last modified: December 12, 2008.

RAMBO, Susan M. April 3, 1883–January 7, 1977.
Smith College (BA 1905, MA 1913), University of Michigan (PhD 1920).

Susan Miller Rambo was born in Easton, Pennsylvania, the eldest of five children of Annie Roberta (Kortz) (b. 1852) and George Green Rambo (b. 1842). Her mother was from Easton, in eastern Pennsylvania. Her father, who was born in New Jersey, was a wholesale grocer in Easton after his marriage to Annie Kortz in about 1880. The other children were Ella K. (b. 1884), George D. (1886–1945), Isabel K. (1887–1974)), and Annie R. (b. 1890).

Susan Rambo attended high school in her home town of Easton before entering Smith College in Northampton, Massachusetts. She graduated from Smith in 1905 and taught mathematics in the high school in Hoosick Falls, New York, near the Massachusetts border for two of the years between 1905 and 1908.

In the fall of 1908, Susan Rambo and Pauline Sperry, who had earned a BA in 1906 and an MA in 1908 from Smith, were hired as assistants in mathematics at Smith College, in part, presumably, since Ruth G. Wood was on leave to study at Göttingen for the year. Except for leaves of absence, Rambo remained in the department at Smith the remainder of her career: as assistant 1908–11, instructor 1911–18, assistant professor 1918–22, associate professor 1922–37, professor 1937–48, and professor emeritus after her retirement in 1948.

In addition to her teaching, Rambo also took graduate courses in her early years at Smith. She had courses in mathematics (Projective Geometry, Theory of Functions, Descriptive Geometry, and History of Mathematics) and in astronomy (Analytical Mechanics, Transit Instrument, Equatorial Telescope, Computing, and History of Astronomy) and received a master's degree from Smith in 1913. References in her master's thesis also include lectures by C. J. Keyser at Columbia University in 1907 and by G. A. Bliss at the University of Chicago in 1910.

In 1916, having taken a leave of absence for the year 1916–17, Rambo entered the University of Michigan. Her Smith colleague and friend, Suzan Benedict, had received her PhD two years earlier from Michigan. Rambo was in residence at Michigan for two years and received her degree in 1920, two years after returning to her position at Smith.

Rambo's many contributions at Smith include introducing a statistics course in her first decade there and serving as department chairman from 1934 to 1940. She attended the International Congress of Mathematicians in Bologna in 1928. Rambo was also a member of the Connecticut Valley Section of the Association of Teachers of Mathematics in New England and of the Round Hill Club, a paper reading club in Springfield. She took a leave of absence the second semester 1937–38 during which she made a trip around the world.

In the Smith College Twenty-Fifth Reunion Class Book in 1930 it was noted that Susan Rambo "drives a Ford, gardens, and keeps a charming home with a friend." She shared a house with Suzan Benedict at one site from 1918 to 1924 and at a second from 1924 until Benedict's death in 1942. Their home was typically the location for the department Christmas party. In 1945 Rambo relinquished her life tenure on the house, and it went to Smith to be sold and the proceeds to be used for scholarships.

Rambo died in a Northampton nursing home in 1977 and was survived by a niece and three nephews; at least two other nephews had been killed in World War

II. In an obituary notice Neal McCoy, a Smith colleague, observed that she had been "impatient with stupidity and appalled by indolence," had had a "lifelong passion for flowers," and was a "kind and generous lady." She was buried in Easton, Pennsylvania. The Susan M. Rambo Fund that provides support for summer student research in mathematics at Smith was established in her memory by a 1931 graduate of Smith.

Organizational affiliations: AMS, MAA, AAAS, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1913 A comparative study of analytic and synthetic projective geometry. MA thesis, Smith College. Typescript.
1920 The point at infinity as a regular point of certain linear difference equations of the second order. PhD dissertation, University of Michigan, directed by Walter Burton Ford.

Publications:
1905 A defense of immigration. *Smith College Monthly* 12:465–70.
1946 Review of *College Mathematics: A General Introduction*, by C. H. Sisam. *Science* n.s., 104:169.

References to: AmMSc 3–8, 9P–10P; AmWom 1935–40.
[Article about Rambo's retirement]. *Smith Alumnae Quarterly* (Aug 1948): 208.
Obituary. *Springfield Union*, 8 Jan 1977.
McCoy, N. H. "Susan M. Rambo." *Smith Alumnae Quarterly* (Apr 1977): 62.

Other sources: Owens questionnaire 1937; Smith College Archives; University of Michigan Archives; University of Michigan Alumni Records Office; US Census 1880, 1900, 1910 PA, 1930 MA.

Last modified: March 26, 2009.

RASMUSEN, Ruth B. March 29, 1899–October 27, 1974.
Concordia College (BA 1921), University of Chicago (MS 1926, PhD 1936).

Ruth Beatrice Rasmusen was born in Moorhead, Minnesota, the first child of Oline (Steen), born in 1876 in Norway, and Robert Rasmusen, born in 1866 in Minnesota. Her mother had immigrated to the United States in 1892 and was later naturalized. Her parents married in about 1898. In 1910 there were three daughters living of five children who had been born. The other two daughters were Esther (1902–1974) and Elizabeth (1905–1992). Their father was a barber in Moorhead.

Ruth Rasmusen attended the public schools of Moorhead and graduated from Moorhead High School in 1918. After three years at Concordia College in Moorhead, she graduated summa cum laude with a mathematics major and a Latin minor. She was a member of the Alpha Society, the scholastic honor society there.

For the next four years, 1921–25, Rasmusen taught in high schools in Minnesota and North Dakota. In the summer of 1925 she enrolled at the University of Chicago and studied there for five consecutive quarters before receiving her master's degree in September 1926.

Rasmusen indicated in her dissertation vita that she was a teacher at the senior high school in Muskegon, Michigan, for three semesters in 1927–28, an instructor at North Dakota State College (now University) in Fargo 1928–29, and an instructor at South Dakota State College (now University) in Brookings 1929–33. She continued her graduate work at the University of Chicago, spending twelve quarters in residence between summer 1930 and summer 1936, after which she received her doctorate with a dissertation in differential geometry directed by E. P. Lane. It appears that Rasmusen was living in her home town of Moorhead for a while after completing her graduate work. She was appointed instructor at the Platteville State Teachers College in Wisconsin (now University of Wisconsin–Platteville) and began teaching there on January 3, 1938.

Rasmusen began her employment with the Chicago Board of Education at Woodrow Wilson Junior College (now one of the City Colleges) in October 1938. She was transferred from Wilson to Chicago Teachers College (now Chicago State University) in September 1953. When rank was first established there in 1959, she was made a full professor, one of 18 of the faculty of 137. Rasmusen became the secretary of the committee on promotion and wrote about the first few years of the new policy in the *Chicago Schools Journal* in 1962. She also contributed book reviews to that journal.

Rasmusen's compulsory retirement occurred in June 1964. She then taught at Kearney State College (now University of Nebraska at Kearney) for the academic year 1964–65. The Chicago Teachers College became a state institution, Illinois Teachers College Chicago–South, with a more lenient retirement policy, in September 1965, and Rasmusen returned to work there until her second retirement in 1967.

Rasmusen continued some research in differential geometry throughout the late 1930s and early 1940s. Her published work includes a joint article in 1941 with Beatrice Hagen of Penn State, who had also been a student of Lane at Chicago. Rasmusen served as an associate editor of *Mathematics Magazine* 1964–68. With two of her colleagues she wrote a text for use at Chicago Teachers College; in 1960 it was published by Allyn and Bacon, with a second edition appearing in 1965.

A profile written at Concordia indicates that she was chairman of the mathematics department at Wilson Junior College and that she inaugurated the mathematics contest there. It notes that she also inaugurated the graduate department in mathematics at Chicago State and sponsored Pi Mu Epsilon. She served as a judge at city mathematics and science fairs, read papers in the Chicago home study department, and taught by invitation at the Chicago Teachers Review School.

A former colleague described Rasmusen as an excellent teacher. He said she was tall, slender, lovely, quiet, retiring, with a sense of humor. He indicated that she liked to travel and was a "rabid" White Sox fan who knew the players' batting averages. A former student, who had a course in differential equations from Rasmusen in one of her last years of teaching, referred to her as adorable, kindly, concerned, caring, and stately. She said Rasmusen was ramrod straight and always well-prepared for class.

In 1970 the Dr. Ruth B. Rasmusen Award was established at Chicago State; it is given annually to a mathematics major who shows outstanding promise as a scholar in the field of mathematics research. In 1972 she received an Alumni Achievement Award from the Concordia College Alumni Association.

For many years Rasmusen lived in Chicago with her sister Esther Rasmusen, who was a biology teacher at a Chicago high school. Esther Rasmusen died in April 1974; six months later Ruth Rasmusen died at age seventy-five in Minneapolis. She was buried in Moorhead and was survived by her sister Elizabeth.

Organizational affiliations: AMS, MAA, Sigma Xi.

Thesis and dissertation:

1926 Metric geometry of the quadric of Lie. MS thesis, University of Chicago, directed by Ernest Preston Lane. Typescript.

1936 Conjugate osculating quadrics associated with the lines of curvature. PhD dissertation, University of Chicago, directed by Ernest Preston Lane. Private edition, 1937, distributed by the University of Chicago Libraries.

Publications:

1938 Metric properties of the cylinder of Kubota. *Bull. Amer. Math. Soc.* 44:674–77. Reviews: *JFM* 64.0736.04 (W. Süss); *Zbl* 019.36901 (W. Haack).

1939 The canonical lines and the extremals of two invariant integrals. *Amer. J. Math.* 61:1004–8. Reviews: *JFM* 65.1409.02 (E. Salkowski); *MR* 1,87c (J. L. Vanderslice); *Zbl* 022.26203 (P. Buzano).

1941 with B. L. Hagen. Comments on canonical lines. *Bull. Amer. Math. Soc.* 47:298–302. Reviews: *MR* 2,301b (J. L. Vanderslice); *Zbl* 025.08301 (W. Haack).

1947 An application of degenerate conics. *Sch. Sci. Math.* 47:502.

1960 with J. M. Sachs and W. J. Purcell. *Basic College Mathematics.* Boston: Allyn and Bacon. Second ed.: 1965. Boston: Allyn and Bacon.

1962 Three years of professorial rank at Teachers College. *Chicago Schools J.* 43:341–44. In special issue, "Chicago Teachers College South."

Abstracts:

1940 Two metric quadrics. *Amer. Math. Monthly* 47:599 #8. Presented to a meeting of the MAA, Bloomington, IL, 10–11 May 1940.

1951 The determination of a quadric surface from its equation in general form. *Amer. Math. Monthly* 58:218–19 #6. Presented to a meeting of the MAA, Carbondale, IL, 12–13 May 1950.

1959 Equation of a quadric surface through nine points. *Amer. Math. Monthly* 66:641 #3. Presented to a meeting of the MAA, Decatur, IL, 8–9 May 1959.

Reference to:
"Dr. Rasmusen." (Obituary) Unidentified newspaper clipping.

Other sources: MS thesis vita 1926; PhD dissertation vita 1937; Owens questionnaire 1937; application for social security account number 1948; conversations with William J. Purcell (former colleague) 1984 and with Carolyn Musto (former student) 1991; communications with Concordia College Alumni Relations, Chicago State University personnel office, Moorhead Public Library, and with Southwest Wisconsin Room, Karrmann Library, University of Wisconsin–Platteville; US Census 1900, 1910, 1920, 1930 MN; SSDI.

Last modified: March 26, 2009.

RAYL, Adrienne S. September 25, 1898–November 27, 1989.
Tulane University (BA 1924, MA 1934), University of Chicago (PhD 1939).

Adrienne Sophie Rayl was born in New Orleans, Louisiana, the daughter of Sophie Catherine (Schick) (1874–1953) and James John Rayl (1871–1952). Her parents were born in New Orleans and were married on January 11, 1898. Her father had an elementary school education, was a cigar classer in 1900, and later was a postal employee; her mother received a high school and normal school education and became an elementary school teacher. Adrienne Rayl was the eldest of eight children. Her siblings were Harold James (b. 1900), Ruth (1903–1987), Naomi (1904–1990), Elsa (1907–1994), Leonora (ca. 1909–1921), Mabel (1910–1989), and Sophie (1913–1994).

Adrienne Rayl attended public grade school and Girls High School in New Orleans, graduating from the latter in 1915 first in her class of fifty-one. She attended the New Orleans Normal School from 1915 to 1917 and graduated, first in her class, with a teaching diploma in 1917.

During the next twenty-two years Rayl taught in the New Orleans public school system and completed all of her undergraduate and graduate work. In 1917 she began teaching seventh and eighth grades at the Beauregard School and began working toward her bachelor's degree by taking courses for teachers and summer school classes at Tulane University. She received her BA in education in 1924 and continued teaching at the elementary school until 1929, when she was transferred to the Edward Douglas White High School to teach mathematics. While teaching at the high school, where she remained until 1939, she attended summer school and afternoon classes, including classes by Nola Anderson (Haynes) and by Marie Weiss, at Tulane and earned her MA in 1934. She immediately began further graduate work at the University of Chicago in the summer of 1934. She took classes there for five consecutive summers and the academic year 1936–37 and finished her dissertation under Walter Bartky in August 1939. Rayl's dissertation concerned the four-body problem. She had begun work in this area while at Tulane and had solved a problem related to the three-body problem when taking a celestial mechanics course there from H. E. Buchanan.

Adrienne S. Rayl spent the next three decades in Birmingham at the University of Alabama Extension Center (now the University of Alabama at Birmingham). When she arrived, there were no women students at the school. In a newspaper article at the time of her retirement, Rayl was quoted as recalling, "The Center had been open only three years when I first came ... and although there were only 116 students enrolled, it was a wonderful opportunity for the working man to attend our evening classes." She was instructor 1939–41, assistant professor 1941–47, associate professor 1947–52, and professor 1952–69. She retired in 1969 with the rank of professor emeritus. While there she taught calculus, differential equations, vector analysis, complex variables, and advanced calculus among other courses. She was also chairman of the Division of Mathematics.

Rayl was a member of the Lutheran Church, Missouri Synod. In the early 1980s she moved back to New Orleans, where she was living at the time of her death in 1989 at ninety-one. She is buried in the Greenwood Cemetery in New Orleans.

Organizational affiliations: AMS, MAA, AAAS, Sigma Delta Epsilon.

Thesis and dissertation:
1934 Summability of Hermitian series. MA thesis, Tulane University.
1939 Stability of permanent configurations in the problem of four bodies. PhD dissertation, University of Chicago, directed by Walter Bartky. Typescript. Printed version, 1942.

Publication:
1928 How do you subtract? *Math. News Letter* 3 (4): 9–12.

References to:
"A Woman's Place Is in the Calculus Class." *Birmingham News*, 6 May 1969.
"Rayl." (Death notice) *New Orleans Times-Picayune*, 29 Nov 1989.

Other sources: PhD dissertation vita 1939; Smithsonian questionnaire 1985 (assisted by nephew); Tulane University Archives; US Census 1900, 1910, 1920 LA; SSDI.

Last modified: December 12, 2008.

REAVIS, Mabel (Griffin). August 28, 1907–November 19, 1999.
Duke University (Woman's College) (BA 1928), Duke University (MA 1930, PhD 1933).

Mabel Jeanette Griffin was the youngest of four children of Naomi Frances (Burke) (1874–1966) and Charles A. Griffin (1871–1958). Her parents were both born in Chatham County, in central North Carolina. Her mother was born in Pittsboro, where she attended the Pittsboro Academy; her father attended county schools and became a carpenter and home builder. They were married on January 9, 1895. The two older children, Pearl (1895–1975) and George Sidney (1898–1981), were born in Pittsboro; Theodore Alton (1904-1964) and Mabel were born in Durham, North Carolina. Pearl Griffin attended Duke University, and George and Theodore attended the city schools in Durham. George became a hosiery mill owner, and Theodore was in the insurance business.

Mabel Griffin was one of the first undergraduates at Duke University's Woman's College, which was founded in 1924 as a coordinate college for women. She received her bachelor's degree magna cum laude in 1928. The next year she had a high-school teaching position and then returned to Duke for graduate work in mathematics. She had a graduate scholarship 1929–31, a graduate fellowship 1931–32, and was an assistant at Duke 1929–32. She completed the work for her master's degree in 1930. She taught in high school 1932–33, the year before she received her PhD with a dissertation written under the direction of J. M. Thomas. Ruth Wyckliffe Stokes had received her doctorate from Duke two years earlier, the first in mathematics from Duke. After receiving her doctorate, Mabel Griffin taught one more year in high school before teaching two years, 1934–36, as professor at Campbell Junior College (now Campbell University) in Buies Creek, North Carolina.

On August 3, 1936, Mabel Griffin married L. Boyd Reavis, who was born in 1907 in Warrenton, North Carolina. L. B. Reavis graduated from Campbell Junior College in 1930. He received further education from Wake Forest University in Winston Salem, North Carolina; Southwestern Baptist Theological Seminary in Fort Worth, Texas; and Howard Payne College (now University) in Brownwood, Texas, from which he earned a Doctor of Divinity degree. After their marriage, they lived in Fort Worth and then Temple, Texas.

For the first four years of their marriage, 1936–40, Mabel Reavis taught as assistant professor at Mary Hardin–Baylor College (now University of Mary Hardin–Baylor) in nearby Belton, Texas. Mary Hardin–Baylor was established in the mid-nineteenth century as the women's division of Baylor University and remained a women's college until 1971. Mabel Reavis later served as a trustee of the college.

In 1939 L. Boyd Reavis took the first of several positions as pastor in Texas. During the next ten years he was pastor of the First Baptist Church in Plainview 1939–45 and of the First Baptist Church in Paris 1945–49. During this time their three children were born. Raynor Boyd was born in December 1940, graduated from Baylor University, and became an executive with an aerospace corporation. Roma Jean, born in April 1943, earned both a bachelor's and a master's degree from Baylor, and became co-host of the Don Wade and Roma Morning Show on WLS radio in Chicago in 1985. Ralph Griffin, born in November 1946, graduated from Texas Christian University and then earned a PhD in education from North Texas State University before holding positions in academia.

In 1949 the Reavis family moved to High Point, North Carolina, where L. Boyd Reavis was pastor of the Green Street Baptist Church for the next four years. Mabel Reavis resumed her career as professor and head of the mathematics department at High Point College 1950–53. In 1953 they returned to Texas, where L. B. Reavis was pastor of the First Baptist Church in Denton for the next two years. In 1955 they moved to Fort Worth, where they remained for forty years. He became director of development for Southwestern Baptist Theological Seminary and held that position until his retirement in 1973.

In 1955 Mabel Reavis began an eighteen-year period as a mathematics faculty member at Texas Christian University. She was assistant professor 1955–58, associate professor 1958–73, and retired as professor emeritus in 1973. During five summers in the 1960s she was director of the mathematics section of the NSF summer science institute at Texas Christian. Mabel Reavis wrote in 1981,

> Teaching is totally satisfying to me. In addition to my enjoyment of subject matter I find the students themselves and their development of potential just as important to me. Counseling outside the classroom has consumed much of my time at T. C. U. The demands of rearing 3 children, being supportive of my husband in his ministry, and University teaching have precluded my pursuance of further research in mathematics except for direction of several Master's theses. (Smithsonian questionnaire)

During her years as a student, Reavis became a member of the education honor societies Delta Kappa Gamma and Kappa Delta Pi, and the physics honor society Sigma Pi Sigma. Later she served as vice president of the TCU chapter of Phi Beta Kappa and served on the TCU faculty senate. She was a member of the TCU Faculty Woman's Club and the Seminary Woman's Club at Southwestern Seminary. She also belonged to the Ridglea Country Club in Fort Worth.

Reavis was a Baptist and included various church-related activities among her interests. She served as an Associational Young People's leader, edited church bulletins, was a member of various study clubs, lectured for local clubs and societies, and engaged in Bible teaching. She listed reading and travel among her interests and, in 1981, described her political affiliation as Independent. In 1991 she and her husband established the L. B. and Mabel Reavis professorship and scholarship program at Campbell University; Reavis scholars are honored for leading their churches in growth and evangelism.

L. Boyd Reavis died in their Fort Worth home in March 1995. Mabel Reavis remained in Fort Worth until 1998, when she moved to Chicago to be close to her daughter. Mabel Griffin Reavis died in her Chicago home in November 1999 at age ninety-two. She was survived by her three children, seven grandchildren, and three great-grandchildren. She was buried in Laurel Land Memorial Park in Fort Worth.

Organizational affiliations: AMS, MAA, AAUW, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:

1930 [Griffin, M. J.] A note on the uniform convergence of infinite series. MA thesis, Duke University. Typescript.

1933 [Griffin, M. J.] Invariants of Pfaffian systems. PhD dissertation, Duke University, directed by Joseph Miller Thomas. Typescript. Printed version, 1933, reprinted from *Trans. Amer. Math. Soc.* 35:929–39.

Publication:
1933 [Griffin, M.] Invariants of Pfaffian systems. *Trans. Amer. Math. Soc.* 35:929–39. Published version of PhD dissertation. Reviews: *JFM* 59.0467.01 (M. Pinl); *Zbl* 008.06502 (J. M. Thomas). Presented by title to the AMS, Atlantic City, NJ, 27 Dec 1932; abstract: *Bull. Amer. Math. Soc.* 39:26 #16.

References to: AmMSc 6, AmWom 1935–40, WhoAmW 4.
Walker, Paula. "Smithsonian to Honor Woman Math Pioneer." *Fort Worth Star-Telegram*, 30 Aug 1981.
"Mabel Griffin Reavis." (Obituary) *Fort Worth Star-Telegram*, 21 Nov 1999.

Other sources: Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; Duke University Archives; L. B. Reavis (obituary) *Fort Worth Star-Telegram*, 21 Mar 1995; US Census 1910, 1920, 1930 NC.

Last modified: March 8, 2009.

REES, Mina S. August 2, 1902–October 25, 1997.
Hunter College (BA 1923), Columbia University (Teachers College) (MA 1925), University of Chicago (PhD 1931).

Mina Spiegel Rees was the youngest of two daughters and three sons of Alice Louise (Stackhouse) (b. 1870) and Moses Rees (b. 1858). Her mother was born in England and immigrated to the United States in 1883, and her father was born in New York of German parents; they married in about 1892. The older children were Elsa I. (1893–1975), Albert L. (1894–1993), Clyde Harvey (1896–1967), and Clarence Eugene (1898–1966). Mina Rees was born in Cleveland, Ohio, but the family moved to New York when she was a baby, and her early schooling was in the New York City public schools.

After graduating from Hunter College High School as valedictorian of her class in 1919, Mina Rees attended Hunter College where she was a mathematics major and very active in governance. She was president of her freshman and sophomore classes and, during her senior year, of the Student Self Governance Association. During her junior year she served as editor-in-chief of the Hunter College yearbook, the *Wistarion*. Rees graduated summa cum laude in 1923 and was awarded an "H" pin as one of the seniors who "distinguished [her]self by signal service to Hunter" during her four years at college.

After her graduation from Hunter, Rees was offered, but refused, a job at the college by the then chair Emma Requa, whose only degree was an 1898 BA from Hunter. Rees related in 1969: "I had formed a firm opinion when I was an undergraduate that this was a bad mistake that the College was making, employing people who had just graduated. I felt that the standards of the College were not high enough and that people should be better educated before they ... became teachers there. So, I said I could not under any circumstances, teach at the College because I wasn't [well enough educated]." Rees also said that Requa "was appalled at anything like this, so she got me a job at Hunter High School" (Interview by Merzbach, 2). Rees was an assistant teacher at the high school and attended Columbia University as a full-time graduate student. She recalled later that, "when I had taken four of their six-credit graduate courses in mathematics and was beginning to think about a thesis, the word was conveyed to me – no official ever told me this, but I learned – that the Columbia mathematics department was really not interested in having women candidates for Ph.D.'s.... That was the only episode that raised a question about the appropriateness of mathematics as a field for women before I had my Ph.D. It was a really traumatic affair for me" (Dana and Hilton, "Mina Rees," 258). Rees's perception is backed up by the fact that the department granted only one PhD to a woman, Edna E. Kramer, between 1923 and 1939. Kramer, who had graduated from Hunter in 1922, received her degree from Columbia in 1930.

After she received her master's degree from Teachers College of Columbia University in 1925, Rees was hired as instructor of mathematics at Hunter College. She saved her money and in 1929 took a leave of absence from Hunter to enroll at the University of Chicago. She chose Chicago because she wanted to study with Leonard Eugene Dickson, whose 1923 *Algebras and Their Arithmetics* she had studied at Columbia. Unfortunately, when she arrived at Chicago, Dickson's attention had turned to number theory, so she referred later to her having been "virtually self-educated" (Interview by Merzbach, 3). On the other hand, Rees's arrival in

Chicago came at an opportune time for her; within a month she represented the Hunter mathematics department at the inauguration of the university's new president and as such was one of the guests of honor at a dinner given by the Chicago department. Rees reported later that soon after that dinner Dickson asked her to write her dissertation with him. She also reported that Dickson believed that, as a mathematician, she probably was on a par with C. C. MacDuffee. However, she did not pursue a research career after her degree because, upon reviewing Oskar Perron's *Algebra* in 1933, she did not feel that she was educated properly in the new Noetherian algebra.

In 1931 Rees completed her dissertation on certain kinds of division algebras, having had a fellowship her last year at Chicago. After receiving her degree in 1931 Rees returned to Hunter College as instructor. She was assistant professor 1932–40 and became associate professor in 1940. In 1943 she took a leave of absence to work for the newly established Applied Mathematics Panel (AMP) of the National Defense Research Committee. She remained officially on leave until 1950.

Rees described the work of the AMP as "an attempt to enlist the assistance of civilian scientists outside the military to help the military ... with weaponry and specific work oriented toward winning the war..." (Interview by Merzbach, 5). She served as a technical aide and executive assistant to Warren Weaver, chief of the AMP. Rees was with the AMP until 1946, when she went to Washington, D.C., to work for the Office of Naval Research (ONR). At ONR she was head of the mathematics branch 1946–49, director of the mathematical sciences division 1949–52, and deputy science director 1952–53. In 1990 a statistician referred to Rees as "the angel of mathematics" at ONR (Mood, "Miscellaneous reminiscences," 39).

The significance of her role during and just after the war was recognized in a resolution adopted by the council of the AMS at its annual meeting in December 1953. It reads in part:

> The very striking and brilliant contributions made by pure (non-military, non-applied) science, not least of these by mathematics, to the winning of World War II is well known. It was clearly seen by the government and those responsible for the armed services that a large scale fostering by the U.S. government of fundamental research, the basis of all research, was unavoidable.... Needless to say as the purest of all sciences, mathematical research might well have lagged behind in such an undertaking. That nothing of the sort happened is beyond any doubt traceable to one person–Mina Rees. Under her guidance, basic research in general, and especially in mathematics, received the most intelligent and wholehearted support. No greater wisdom and foresight could have been displayed and the whole postwar development of mathematical research in the United States owes an immeasurable debt to the pioneer work of the Office of Naval Research and to the alert, vigorous and farsighted policy conducted by Miss Rees. The influence of these policies has been such that it vitally affected later developments: the activities of Air Force and Ordinance research, the National Science Foundation itself. It is well known that in these more recent organizations Mina Rees was constantly appealed to for counsel and guidance. (*Bull. Amer. Math. Soc.* 60 (1954): 134)

Although the Institute for Mathematical Statistics adopted a similar resolution, in 1987 Albert H. Bowker, a statistician from Stanford University who had been chancellor of the City University of New York 1961–72, said that he had "always thought that Mina and ONR have not been given enough credit for the development of mathematical statistics in this country" (Olkin, 475). In 1989 Rees was one of four mathematicians from the ONR awarded the IEEE Computer Society Pioneer Award.

Mina Rees returned to Hunter College as professor of mathematics and dean of the faculty in 1953 and became head of a new Office of Institutional Research there the following year. On June 24, 1955, she married Leopold Brahdy, a physician whom she had known for many years. Brahdy was born in Vienna, Austria, in 1892 and immigrated with his family to the United States when he was six. He later chaired the Metropolitan New York Section of the History of Science Society. Brahdy died in 1977.

Rees remained as professor and dean until 1961 when the City University of New York was founded, and she became professor and dean of graduate studies at CUNY. In the latter position she was instrumental in shaping the nature of graduate studies at CUNY. She was provost of the graduate division 1968–69 and was president of the Graduate School from 1969 until her retirement as president emeritus in 1972. She wrote a report, "The first ten years of the Graduate School, The City University of New York," the year she retired.

Rees was interested in mathematics education and wrote several articles for the NCTM journal *Mathematics Teacher*. During the 1960s she served on several advisory committees for educational projects including one formed by the Conference Board of the Mathematical Sciences for a course on contemporary mathematics on the NBC program Continental Classroom. She was also a member of the consultants bureau of the MAA Committee on the Undergraduate Program in Mathematics in 1961 and served on the steering committee for a study of mathematics curriculum supported by an NSF grant and reported on at the Cambridge Conference on School Mathematics in 1963.

Starting in the 1950s, Rees served in a number of important positions in scientific organizations. Especially noteworthy were her positions in 1964–70 on the National Science Board, to which she was appointed by President Lyndon Johnson, and within the AAAS, where she became the first woman president in 1971. Also in the AAAS, where she was a fellow, she served as vice president 1953–54, chairman of Section A 1953–54, member of the board of directors 1957–60, and chairman of the board 1972. Her positions within the ACM included her appointment to the original executive council 1947–48 and her election to the executive council 1948–50. For the AMS she was on the nominating committee 1952 and was a trustee 1955–59. In the MAA she was vice president 1963–64, was vice chairman 1955 and chairman 1956 of the New York Metropolitan Section, and was on or served as chairman of numerous committees; these included the committee on World War II History 1981–83. For SIAM she was councillor 1953–56, on the committee on visiting lecturers 1959–60, representative on the AAAS council 1958–61, and on the board of directors of the SIAM Institute for Mathematics and Society. She was councillor 1957–60 for the New York Academy of Sciences. She also served as a member of the executive committee of the American Conference of Academic Deans 1960–62. She chaired a panel on the level and forms of support in the mathematical

sciences for a report issued in 1968 by the Committee on Support of Research in the Mathematical Sciences (COSRIMS) of the National Research Council for the Committee on Science and Public Policy of the National Academy of Sciences. In addition to her many posts, she often chaired sessions at meetings, symposia, and conferences and also gave a number of banquet addresses.

Publications by and about Rees are so numerous that we have not attempted to list them all. Two references to Rees, the 1962 article in the *Monthly* and the 1987 article by Phyllis Fox in *Women of Mathematics: A Biobliblіographic Sourcebook*, list several additional reports or articles by Rees that we have not included; Fox also lists several references to Rees that do not appear below.

Among Rees's many honors are at least eighteen honorary degrees from US colleges and universities; the King's Medal for Service in the Cause of Freedom "in recognition of valuable services rendered to the Allied war effort" 1948 (*Bull. Amer. Math. Soc.* 54 (1948): 493); the President's Certificate of Merit 1948; MAA's first award for service to mathematics 1962; Hunter College High School's first distinguished graduate 1965; AAUW achievement award 1965; a AAAS Symposium to Honor Mina Rees, January 1982; and the Public Welfare Medal, National Academy of Sciences, "for her contributions to the scientific enterprise, especially in mathematics, astronomy and computer science, from wartime, through the transition from war to peace, and continuing today" April 25, 1983 (NAS Archives). The library at the Graduate School and University Center of CUNY was dedicated as the Mina Rees Library in 1985. In 1970 she was also featured in *Vogue* magazine as one of nine women described as "Liberated. All Liberated."

Rees had broad cultural interests that included music, dance, and literature. It was noted in her 1985 profile in *Mathematical People* that she was "an accomplished painter ... [who] for a time ... studied in Mexico every year" (p. 257). Later she went to Maine in summers and painted there. She was a frequent traveler abroad and made trips to South America and Europe. She was a member of the Unitarian Church of All Souls in Manhattan for many years.

Mina Rees died at the Mary Manning Walsh Home in Manhattan a few months after her ninety-fifth birthday. She was survived by a niece, a great-niece, and grand-nephews. She left $1.7 million to the CUNY Graduate Center to establish a fellowship and to endow a chair in mathematics. At the CUNY Graduate Center the Mina Rees Dissertation Fellowships in the Sciences are awarded annually. In addition, at least one Mina S. Rees Graduate Scholarship in Sciences and Mathematics is awarded annually to students in, or about to enroll in, a PhD program at CUNY. She is the subject of two doctoral dissertations.

Organizational affiliations: AMS, MAA, SIAM, AAAS (fellow), Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Dissertation:

1931 Division algebras associated with an equation whose group has four generators. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Private edition, 1932, reprinted from *Amer. J. Math.* 54:51–65.

Selected publications:

1932 Division algebras associated with an equation whose group has four generators. *Amer. J. Math.* 54:51–65. Published version of PhD dissertation. Reviews: *JFM* 58.0141.04 (W. Burau); *Zbl* 003.24501 (H. Brandt).

1933 Review of *Algebra*, 2nd ed., by O. Perron. *Amer. Math. Monthly* 40:484–85.

1935 Review of *Triumph der Mathematik*, by H. Dörrie. *Scripta Math.* 3:345–46.

1936 Review of *The Search for Truth*, by E. T. Bell. *Scripta Math.* 4:79–80.
1940a Lao Genevra Simons. *Scripta Math.* 7:7–8.
1940b Review of *A Semicentennial History of the American Mathematical Society, 1888–1938*, by R. C. Archibald, and *Semicentennial Addresses*. *Scripta Math.* 7:121–25.
1941 Review of *Trigonometry*, rev. ed., by N. J. Lennes and A. S. Merrill. *Amer. Math. Monthly* 48:473.
1948 The mathematics program of the Office of Naval Research. *Bull. Amer. Math. Soc.* 54 (1, pt. 1): 1–5.
1950 The federal computing machine program. *Science* n.s. 112:731–36. Invited address presented to the ACM, Washington, DC, 8 Sep 1950. Reprint: 1985 with new introduction. *Ann. Hist. Comput.* 7:156–63.
1951 with H. W. Brinkmann, Z. I. Mosesson, S. A. Schelkunoff, and S. S. Wilks. Professional opportunities in mathematics. A report for undergraduate students of mathematics. *Amer. Math. Monthly* 58:1–24.
1952a Digital computers—their nature and use. *Amer. Scientist* 40:328–35.
1952b with R. Courant and E. Isaacson. On the solution of nonlinear hyperbolic differential equations by finite differences. *Comm. Pure Appl. Math.* 5:243–55. Reviews: *MR* 14,756e (H. Polachek); *Zbl* 045.11704 (H. Beckert).
1953a Applying computers to machine control. *Mach. Design* 25:324–34. Abstract of presentation, "The future use of digital computers," to the Natl. Applied Mechanics Conference of the Amer. Soc. of Mech. Engs., Minneapolis, MN, June 1953.
1953b Modern mathematics and the gifted student. *Math. Teacher* 46:401–406.
1953c Preface. In *Higher Transcendental Functions, Vol. I* by A. Erdélyi, W. Magnus, F. Oberhettinger, and F. G. Tricomi, ix–x. McGraw Hill. Review of book: *Bull. Amer. Math. Soc.* 60:405–8 (G. Szegö). Reprint: 1981. Melbourne, Fla.: Robert E. Krieger Publishing Co.
1954a Computers: 1954. *Sci. Monthly* 79:118–24.
1954b Mathematics and federal support. *Science* n.s. 119:3A.
1954c Review of *An American in Europe: The Life of Benjamin Thompson, Count Rumford*, by E. Larsen. *Sci. Monthly* 79:189.
1955a Digital computers. *Amer. Math. Monthly* 62:414–23. Review: *Zbl* 64.38001 (A. Speiser).
1955b New frontiers for mathematicians. *Pi Mu Epsilon J.* 2:122–27.
1955c Review of *Advanced Mathematics for Engineers*, by H. W. Reddick and F. H. Miller. *Science* n.s. 122:204.
1955d Review of *Numerical Methods*, by A. D. Booth. *Science* n.s. 122:422.
1955e Review of *Transactions of the Symposium on Computing, Mechanics, Statistics and Partial Differential Equations. Held at the University of Chicago 29–30 Apr. 1954. Vol. II, Symposium on Applied Mathematics*, by F. E. Grubbs, F. J. Murray, and J. J. Stoker. *Science* n.s. 122:697.
1957 Review of *Proceedings of the Third Berkeley Symposium on Mathematical Statistics and Probability. Vol. II. Astronomy and Physics*, ed. J. Neyman. *Amer. Math. Monthly* 64:441–43.
1958a The impact of the computer. *Math. Teacher* 51:162–68.
1958b Mathematicians in the market place. *Amer. Math. Monthly* 65:332–43.
1961 Support of higher education by the federal government. *Amer. Math. Monthly* 68:371–77. Keynote address at a meeting on Federal Support of Higher Education called by the Conference Board of the Mathematical Sciences, Washington, DC, 12–13 Nov 1960.
1962 The nature of mathematics. *Math. Teacher* 55:434–40 and *Science* n.s. 138:9–12. Presented to a meeting of the NCTM, San Francisco, CA, 15–18 Apr 1962.
1964 How can the undergraduate college best meet curricular pressures from graduate and professional schools and from new developments in secondary education? In *Undergraduate Education: The Proceedings of the Nineteenth Annual National Conference on*

Higher Education, April 19–22, 1964, ed. G. K. Smith, 70–73. 1964 Current Issues in Higher Education. Washington, DC: Association for Higher Eduction, NEA. Presented by Claude E. Hawley, associate dean of general studies, CUNY.

1965a The dilemma that faces us. *AAUW J.* 9 (1): 32–34.

1965b Efforts of the mathematical community to improve the mathematics curriculum. In *Emerging Patterns in American Higher Education*, ed. L. Wilson, 228–33. Washington, DC: American Council on Education. Presented to a meeting of ACE, San Francisco, CA, 1–2 Oct 1964.

1971 A humane approach to population problems. *Science* n.s. 173:381.

1972a Come, now, and let us reason together. *Science* n.s. 178:1155.

1972b Graduate education—a long look. In *Graduate Education Today & Tomorrow*, eds. L. J. Kent and G. P. Springer, 139–51. Albuquerque: University of New Mexico Press.

1973 The saga of American universities: The role of science. *Science* n.s. 179:19–23. Retiring presidential address, AAAS, Washington, DC, 28 Dec 1972.

1974a The graduate education of women. In *Women in Higher Education*, eds. W. T. Furniss and P. A. Graham, 178–87. Washington, DC: American Council on Education. Presented to a meeting of the ACE, Miami Beach, FL, 4–6 Oct 1972.

1974b Preface to *Directory of Data Bases in the Social and Behavioral Sciences*, ed. V. S. Sessions, vii–ix. New York: Science Associates/International.

1975 The scientist in society: Inspiration and obligation. *Amer. Scientist* 63:144–49.

1976a The ivory tower and the marketplace. In *On the Meaning of the University*, ed. S. M. McMurrin, 81–101. Salt Lake City: University of Utah press. Reviews of book: *Brit. J. Educ. Studies* 25:291–92 (R. Niblett); *J. of Higher Educ.* 48:605–7 (G. L. Anderson); *Peabody J. Educ.* 56:248–49.

1976b with A. H. Livermore. Editorial. Milestone legislation for a metric United States. *Science* n.s. 191:141. Review: *Hist. Math.* 3:382 (H. S. Tropp).

1976c with W. F. Shenton. Algebra. In *Encyclopedia Americana*, 1:555–62.

1977a Early years of the mathematics program at ONR. *Naval Research Reviews* 30 (2): 22–29. Thirtieth anniversary article. Reprint: 1984. In *Mathematics: People, Problems, Results* vol. 3, eds. D. M. Campbell and J. C. Higgins, 201–6. Belmont, CA: Wadsworth International.

1977b Mathematics and the government: The post-war years as augury of the future. In *The Bicentennial Tribute to American Mathematics*, ed. D. Tarwater, 101–16. Reviews of book: *Amer. Math. Monthly* 88:770–71 (G. H. Moore); *Hist. Math.* 6:101 #982 (A. C. Lewis); *Math. Gaz.* 63:203–5. Presented to the MAA, San Antonio, TX, 26 Jan 1976.

1979 with D. L. Bernstein, M. G. Humphreys, and A. F. O'Neill. Women mathematicians before 1950. *AWM Newsletter* 9 (4): 9–18. Transcription of a panel discussion sponsored by the AWM, Providence, RI, 9 Aug 1978, ed. P. Kenschaft. Reprint of pages 15–18, with editorial revisions: 2005. Government and administration. In *Complexities*, eds. B. A. Case and A. M. Leggett, 222–27. Princeton, NJ: Princeton Univ. Press.

1980 The mathematical sciences and World War II. *Amer. Math. Monthly* 87:607–21. Reviews: *MR* 82j:01059 (F. J. Murray); *Zbl* 446.01019 (H. E. Heatherly). Reprint: 1988. In *A Century of Mathematics in America, Part I*, ed. P. Duren, 275–89. Review: *Zbl* 718.01026 (D. Laugwitz).

1982 The computing program of the Office of Naval Research, 1946–1953. *Ann. Hist. Comput.* 4:102–20. Review: *MR* 83i:01085 (Author's summary). Reprint: 1987. *Comm. ACM* 30:830–48.

1987 Warren Weaver. *Biog. Memoirs Nat. Acad. Sci. USA* 57:493–530.

Presentations not listed above:

The forgotten man of computing. Presented to a meeting of the ACM, Oak Ridge, TN, 18–20 Apr 1949.

The role of mathematics in government research. Presented to SIAM, Apr 1952.

Mathematicians in industry and government. Presented by title to the MAA, University Park, PA, 27 Aug 1957.

Selected references to: AmMSc 5–8, 9P–11P; AmMWSc 12P–13P, 14–22; AmWomSc; BiDWSci; BioWMath; CurBio 1957, 1998; HisDcDP; InSci; IntWW 38–54; InWom; InWom SUP; LEduc 5; MacTutor; NotMat; NotSci 1S, 2; NotTwCS 1; NotWoMa; NotWoSc; Sc&ItsT 6; WhAm 12; WhoAm 29, 38–49; WhoAmW 1–8.

"King's Medal to Dr. Rees." *New York Times*, 7 May 1949.
"Hunter Group Told of Women's Gains." *New York Times*, 22 Jun 1951.
"Navy Research Aide Made Dean of Hunter Faculty." *New York Times*, 26 Apr 1953.
"Hunter Dean Is Honored." *New York Times*, 28 Oct 1953.
Council Resolution regarding Mina Rees. *Ann. Math. Statist.* 24 (1953): 696–97.
Resolution of Council. *Bull. Amer. Math. Soc.* 60 (1954): 134–35.
Taylor, Mildred E. "Mina Spiegel Rees." *Pi Mu Epsilon J.* 1 (1954): 395–99.
Currivan, Gene. "Drills Taken Out of Mathematics to Give It More Student Appeal." *New York Times*, 14 Oct 1956.
"Hunter Dean Is Honored." *New York Times*, 15 Jan 1957.
Terte, Robert H. "Woman to Shape City University." *New York Times*, 10 Jul 1961.
"Creative Mathematician: Mina Spiegel Rees." *New York Times*, 10 Jul 1961.
"Professional Women Cite New Dean." *New York Times*, 1 Oct 1961.
"New Yorker Presented Award in Mathematics." *New York Times*, 26 Jan 1962.
"Award for Distinguished Service to Mathematics." *Amer. Math. Monthly* 69 (1962): 185–87.
"Science Board Confirmations." *New York Times*, 10 Jul 1964.
Blakeslee, Sandra. "Dynamic Scientist." *New York Times*, 10 Jul 1969.
"Liberated. All Liberated. Dr. Mina Rees. Problems Solved–for Fun." *Vogue* 155 (1 Jun 1970): 120.
"Graduate Center Dedicates Mall: Dr. Rees Is Inaugurated at Ceremony in Midtown." *New York Times*, 5 Jun 1970.
Weyl, F. Joachim. "Mina Rees, President-Elect 1970" *Science* n.s. 167 (1970): 1149–51.
"Rees Awarded Medal." *AWM Newsletter* 13 (May–Jun 1983): 9–10.
"Mina Rees Awarded NAS Public Welfare Medal." *Notices Amer. Math. Soc.* 30 (1983): 304.
"Rees Gift Supports History Project." *Focus* 3 (3) (1983): 7.
Dana, Rosamond and Peter J. Hilton, interviewers. "Mina Rees." In *Mathematical People*, eds. Donald J. Albers and G. L. Alexanderson, 255–67. Cambridge, MA: Birkhäuser Boston, 1985.
Anderson, Susan Heller and David W. Dunlap. "New York Day by Day: Honor for a CUNY Leader." *New York Times*, 12 Nov 1985.
"City University of New York Dedicated Library." *Notices Amer. Math. Soc.* 33 (1986): 49.
"Mina Rees Library Dedicated." *AWM Newsletter* 16 (Jan–Feb 1986): 7.
Fox, Phyllis. "Mina Rees (1902–)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 175–81. Westport, CT: Greenwood Press, 1987.
Brozan, Nadine. "Chronicle: A Prominent Mathematician Celebrates Her Birthday, and the Sum Is 90." *New York Times*, 9 Sep 1992.
Saxon, Wolfgang. "Mina S. Rees, Mathematician and CUNY Leader, Dies at 95." *New York Times*, 28 Oct 1997.
"Deaths: Mina Rees, Mathematician." *Washington Post*, 30 Oct 1997.
"Mathematician Mina Rees; Worked on Early Rockets." (Obituary) *Chicago Tribune*, 31 Oct 1997.

Green, Judy, Jeanne LaDuke, Saunders Mac Lane, and Uta C. Merzbach. "Mina Spiegel Rees (1902–1997)." *Notices Amer. Math. Soc.* 45 (1998): 866–73. The section by Green and LaDuke was adapted from "Mina S. Rees: 1902–1997." *AWM Newsletter* 28 (Jan–Feb 1998): 10–12.
Matsushita, Marimi. "A Woman Mathematician and Her Contributions: Mina Spiegel Rees." EdD dissertation, Columbia University Teachers College, 1998.
Obituary. *IEEE Ann. Hist. Comput.* 20, no. 1 (1998): 65–66.
Shell, Amy. "Reshaping Graduate Education: Looking Back at the Wisdom of Mina Rees." *Focus* 21 (9) (2001): 14–16.
Williams, Kathleen Broome. "Mina Spiegel Rees: Science Administrator." Chap. 5 in *Improbable Warriors: Women Scientists and the U.S. Navy in World War II*. Annapolis, MD: Naval Institute Press, 2001.
Rosenbloom, Stephanie. "Bulletin Board: Benefactor's Chair Filled at CUNY." *New York Times*, 7 Aug 2002.
Shell-Gellasch, Amy. "Mina Rees and the Funding of the Mathematical Sciences." *Amer. Math. Monthly* 109 (2002): 873–89.
Green, Judy. "Rees, Mina S." In *Notable American Women: A Biographical Dictionary, Completing the Twentieth Century*, ed. Susan Ware, 539–41. Cambridge, MA: Belknap Press of Harvard University Press, 2004.
Shell-Gellasch, Amy. *In Service to Mathematics: The Life and Work of Mina Rees.* Boston: Docent Press, 2011. Published version of DA dissertation, University of Illinois at Chicago, 2000.

Selected unpublished interviews:

Mina Rees. Interview by Uta C. Merzbach, 19 Mar 1969. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution, Washington, DC. Transcript.
Mina Rees. Interview by Henry Tropp, 14 Sep 1972. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution, Washington, DC. Transcript.
Mina Rees. Interview by Henry Tropp, 20 Oct 1972. Computer Oral History Collection, Archives Center, National Museum of American History, Smithsonian Institution, Washington, DC. Transcript.
Mina Rees. Interview by Nina Cobb, 16 Nov 1983–20 Jan 1984. Women in the Federal Government Oral History Project, OH-40, folder #31, Schlesinger Library, Radcliffe Institute, Harvard University. Transcript.

Other sources: PhD dissertation vita 1932; Owens questionnaire 1937; conversation with author 1980; Columbia University Archives; Hunter College Archives; communication with NAS Archives; Ingram Olkin, "A conversation with Albert H. Bowker," *Stat. Sci.* 2 (1987): 472–83; Alexander M. Mood, "Miscellaneous reminiscences," *Stat. Sci.* 5 (1990): 35–43; US Census 1900 OH; 1900, 1910, 1920, 1930 NY; SSDI.

Last modified: January 22, 2016.

REILLY, Sister Mary Henrietta. February 14, 1895–April 21, 1964.
St. Xavier College (BA 1923, MA 1925), Catholic University of America (PhD 1936).

Margaret Reilly was born in Chicago, Illinois, the daughter of Agnes (Finn) (b. 1869) and Michael Reilly (b. 1862), both born in Illinois of Irish parents. They married in 1891. In 1900 the family lived in Chicago, and there were three children, Agnes (b. 1893), Margaret (b. 1895), and Michael (b. 1898). Her father's occupation was listed as sewer builder.

Margaret Reilly received her high school diploma from Our Lady of Mercy Academy in Cincinnati in June 1914 and entered the congregation of the Religious Sisters of Mercy in Cincinnati that same month. She took the religious name Mary Henrietta and was known as Sister Henrietta. She took her perpetual vows in August 1917.

Except for her years as a doctoral student at Catholic University in Washington, D.C., all but one of Sister Mary Henrietta's assignments were in Cincinnati. She first taught in primary and secondary schools in Cincinnati while obtaining her bachelor's and master's degrees and her state high school life teacher's certificate. She then taught in a teachers' college in Cincinnati and studied for her doctorate in Washington. Finally, she spent the last decade of her life teaching in secondary schools in Piqua, Ohio, and in Cincinnati.

Sister Henrietta taught second grade at St. Edward School 1914–16; grades five and six at St. Andrew School 1917–19; grades nine and ten, and music at Our Lady of Mercy Academy 1919–22; grade nine and English at Elder High School 1922–25; and grades seven through ten and twelve at Mother of Mercy Academy 1925–28. During this period she obtained her bachelor's degree in 1923 from St. Xavier College (Xavier University since 1930), a Jesuit college for men, by attending special classes scheduled in late afternoons, Saturdays, and summers for the sisters from local and neighboring congregations. She obtained her state high school life certificate in December 1923 having also earned credits from what was called in congregation records Our Lady of Mercy Normal. She received a master's degree from St. Xavier College in August 1925 with a major in sociology and a minor in philosophy.

In the period 1928–36 Sister Henrietta taught mathematics and science, and she continued her studies. She taught at Teachers' College of the Athenaeum of Ohio 1928–31 and apparently earned some credits there as well. She then studied at Catholic University, where she was in residence 1931–32. She taught again at Teachers' College 1933–34 before returning to Catholic University where she was again in residence 1934–36. She wrote her dissertation in algebraic geometry and received her PhD in 1936.

Sister Henrietta then returned to Cincinnati to resume her college teaching of mathematics in the Athenaeum of Ohio. The Athenaeum had been formed by the archbishop of Cincinnati in 1928 as a collection of four institutions: Mount St. Mary's of the West and St. Gregory seminaries, Teachers' College, and the Institutum Divi Thomae, a graduate school of scientific research. Sister Henrietta was head of the department at Teachers' College at least from 1939 until 1949 and remained there until 1953, when the Teachers' College was discontinued and the Institutum relocated.

Sister Henrietta's teaching assignments were in high schools for the rest of her life. She taught in a high school in Piqua, Ohio, 1953–55; in Our Lady of Mercy High School in Cincinnati 1955–56, and in Mother of Mercy High School in the Westwood neighborhood of Cincinnati, 1956–64. At the high school level she taught English, religion, mathematics, history, chemistry, and Latin.

Sister Mary Henrietta Reilly died in Mercy Hospital, Hamilton, Ohio, in 1964 at sixty-nine.

Organizational affiliation: MAA.

Dissertation:

1936 Self-symmetric quadrilaterals in-and-circumscribed to the plane rational quartic curve with a line of symmetry. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC, by J. H. Furst Co., Baltimore, MD. Summary: *Catholic University of America. Graduate School of Arts and Sciences. Summaries of dissertations accepted in partial fulfillment of the requirements for degrees.* 1935–1936: 16.

Other sources: Owens questionnaire 1937; communication with Sisters of Mercy Provincialate (OH); US Census 1900, 1910, 1920 IL, 1930 OH.

Last modified: December 12, 2008.

REKLIS, Virginia (Modesitt). June 15, 1910–November 29, 2000.
Mount Holyoke College (BA 1931), University of Illinois (MA 1932, PhD 1937).

Virginia Modesitt was born in Bloomington, Indiana, the only child of Floy (Underwood) (1885–1984) and Raymond Lyons Modesitt (1883–1927). Both of her parents were natives of central Indiana; her mother was born in Putnam County and her father in neighboring Parke County. Both received bachelor's degrees from Indiana University in 1908; her father also earned a master's degree from Indiana the following year. They were married on August 17, 1909, and Virginia Modesitt was born the following June. The 1910 census lists her father as a high school teacher in Bloomington.

Raymond Modesitt became a teacher of mathematics at Eastern Illinois State Normal School, in Charleston (later Eastern Illinois State Teachers College, now Eastern Illinois University). He did additional graduate work in mathematics at Columbia University in 1911 and at the University of Illinois in 1921. In 1913 R. L. Modesitt served as chairman of a committee of the mathematics section of the University of Illinois High-School Conference that studied the establishment of standards for high-school algebra; he later wrote an article for the *Mathematics Teacher* on fundamental principles of algebra (15 (1922): 332–46). Virginia Modesitt graduated from Eastern Illinois State Teachers College High School in 1927. Her father died suddenly in December of that year, and she remained in Charleston and attended the teachers college for a year before entering Mount Holyoke College in September 1928. She had a major in mathematics and a minor in astronomy at Mount Holyoke. She did honors work with Marie Litzinger, who had not yet earned her doctorate, and all of her mathematics course work there was with Litzinger and Emilie Norton Martin. Modesitt attended Butler University in Indianapolis, Indiana, in the summer of 1930 and graduated from Mount Holyoke magna cum laude in 1931. She also tutored during her senior year at Mount Holyoke.

In the fall of 1931 Modesitt entered the University of Illinois for graduate work. She received her master's degree the following year and stayed at Illinois until she received her doctorate in 1937 with a minor in astronomy. Her dissertation in differential geometry was directed by Harry Levy. In addition to her course work with Levy, she later recalled and mentioned courses with R. D. Carmichael, A. B. Coble, and A. R. Crathorne. She read history of mathematics with G. A. Miller and took higher algebra with Olive C. Hazlett. While at Illinois she was a secretary in the astronomy department 1933–34 and was an assistant in the mathematics department 1934–37. In 1934 she published an article with a fellow graduate student, Ted Martin (later chair of the mathematics department at MIT), in the *Astrophysical Journal*.

After receiving her degree in 1937, Modesitt took a temporary instructorship at Randolph-Macon Woman's College in Virginia to substitute for someone on leave of absence. Modesitt took more mathematics courses at the University of Michigan during the summer of 1938. The position at Randolph-Macon was extended one more year, but no position was available there in the fall of 1939 even though she had enthusiastic support from Gillie Larew, the mathematics department chair at Randolph-Macon.

In 1939 Modesitt moved to Chicago, where she was an instructor at Wright Junior College for the next four years. She had learned of the job there through Ruth Mason Ballard, with whom Modesitt had shared an office during 1936–37, Modesitt's last year at Illinois. Ruth Mason had been an instructor at Illinois before moving to Wright Junior College in 1938. At Wright they worked together on the development of survey courses for junior colleges, and both remained there until 1943, when Wright was taken over by the Navy as barracks and all the junior colleges in the city were combined into one. While in Chicago Modesitt was a member of the Women's Math Club and presented a paper at one of the meetings.

On January 20, 1942, Virginia Modesitt married Ernest Peter Reklis, whom she had met while both were students at the University of Illinois. Ernest Reklis, born in Cicero, Illinois, in 1912, was an engineer who worked at Commonwealth Edison in Chicago after receiving his BS in engineering from Illinois in 1939. He was in the army from 1943 to 1945; they moved to the East, where both worked at the Aberdeen Proving Ground in Maryland. Virginia Reklis was first a "computer" and then a mathematician at the Ballistic Research Laboratories, Army Service Forces, 1944–47. After the war Ernest Reklis remained at the Ballistic Research Laboratories at the Aberdeen Proving Ground as an engineer working on supersonic wind tunnels.

Their son, Robert Peter Reklis, was born in September 1947. He subsequently earned a PhD in physics and is a research scientist in California. Virginia Reklis did not seek employment while their son was young. However, she later was an instructor of extension courses: for the University of Maryland at the Edgewood Arsenal in Maryland 1960–65, and for the University of Delaware at the Aberdeen Proving Ground 1962–66.

In her 1985 Smithsonian questionnaire, Virginia Reklis noted that she was brought up in an academic community and that her father was an outstanding teacher of mathematics. She described her religious preference as Presbyterian. She was a member of the Daughters of the American Revolution and the P.E.O. Sisterhood, a philanthropic educational organization. Beginning in 1967, Reklis published several genealogies, some of which were coauthored with Helen Kurtz Wray. Virginia Reklis's husband died at age sixty-two in 1975; her mother died at ninety-nine in 1984. In the middle 1980s Virginia Reklis lived in her mother's former home in Danville, Indiana. She later moved to California, closer to her son's family.

Virginia Reklis died at Palo Alto Commons, an assisted living facility in Palo Alto, California, in November 2000 at age ninety. She was survived by her son, three grandchildren, and two great-grandchildren. A memorial service was held in Danville, Indiana, and she was buried in the Danville South Cemetery.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, Phi Beta Kappa, Sigma Xi, Pi Mu Epsilon.

Dissertation:

1937 [Modesitt, V.] Some singular properties of conformal transformations between Riemannian spaces. PhD dissertation, University of Illinois, directed by Harry Levy. Typescript. Abstract, 1937, Urbana, IL.

Publications:

1934 [Modesitt, V.] with T. Martin. A solution of the light-curve of X trianguli. *Astrophys. J.* 79: 361–36.

1938 [Modesitt, V.] Some singular properties of conformal transformations between Riemannian spaces. *Amer. J. Math.* 60:325–36. Reviews: *JFM* 64.1362.01 (K. H. Weise); *Zbl* 018.42303 (D. J. Struik).
1942a [Modesitt, V.] Review of *A Mathematician's Apology*, by G. H. Hardy. *Natl. Math. Mag.* 16:311.
1942b The use of medians in a testing program in mathematics. *Natl. Math. Mag.* 16:345–49.

Technical reports:
1946 Comparison of optical and radar observations of WAC Corporal (Rd 10). Memorandum Report no. 438. Ordnance Dept. Ballistic Research Laboratories, Aberdeen Proving Ground.
1948 with C. R. Cassity. The calculation of maximum ordinate of an A–4 rocket from conditions at burnout. Report no. 655. Ballistic Research Laboratories, Aberdeen Proving Ground.

Abstract not listed above:
1941 [Modesitt, V.] The teaching of mathematics in the junior college. *Amer. Math. Monthly* 48:167 #1. Presented to the MAA and the NCTM, Baton Rouge, LA, 1 Jan 1941.

Genealogies:
The family of Charles and Frances Modesitt. 1967.
The family of William and Jane Powers (Neves) Harris of Putnam County, Indiana. 1972.
Some Underwood families of Hendricks and Putnam Counties, Indiana. 1977 and 1993.
with H. K. Kurtz. The family of Conrad and Elizabeth Kurtz of Nelson County, Kentucky. 1992.
with H. K. Kurtz. The family of David Cassity of Bath County, Kentucky and Putnam County, Indiana. 1992
with H. K. Kurtz. A Wingate family of Putnam County, Indiana from Delaware and Maryland by the way of Kentucky. 1993.

References to:
"Reklis." (Obituary) *Hendricks County* (*IN*) *Flyer*, 11 Dec 2000.
"Virginia Reklis." (Obituary) *Danville* (*IN*) *Republican*, 14 Dec 2000.

Other sources: PhD dissertation vita 1937; Owens questionnaire 1940; Smithsonian questionnaire 1985; conversation with author and Uta C. Merzbach, June 24 1986, Danville, IN; Mount Holyoke College Archives; communication with Danville, IN, Public Library; Stanford, "The History of the Department of Mathematics at the University of Illinois"; US Census 1910 IN, 1920, 1930 IL.

Last modified: August 1, 2009.

ROE, Josephine (Robinson). May 5, 1858–April 29, 1946.
Oberlin College (BA 1894), Dartmouth College (MA 1911), Syracuse University (PhD 1918).

Josephine Alberta Robinson was born in Meredith, New Hampshire, the daughter of Frances Eliza (Weld) (1831–1906), a native of Maine, and Joseph Wadleigh Robinson (1817–1886) of New Hampshire, a farmer. The marriage in 1852 was the second for her father. She had two older sisters and four younger brothers. Her siblings were: Helen Augusta (1854–1932), Emma Jane (1856–1864), Francis Joseph (1864–1935), Maurice Henry (1865–1946), Charles Frederick (1866–1932), and George Washington (b. 1872). Her three youngest brothers all attended Dartmouth College; Maurice Henry and Charles Frederick graduated in 1890, and George Washington transferred to Harvard after his sophomore year. Maurice Henry Robinson became an economist and spent most of his career at the University of Illinois after earning a PhD from Yale in 1902. Charles Frederick Robinson became a Congregational minister and, after his retirement, taught at Boston University. George Washington Robinson became an author and was secretary of the Harvard Graduate School of Arts and Sciences 1904–28.

Josephine Robinson did her secondary work at the New Hampton Literary Institution, a few miles west of Meredith. She entered in November 1873, did the English course, and graduated in 1880, having completed both the commercial and the regular courses. She taught for more than a decade in New Hampshire schools before entering college. Her early teaching positions included: teacher in New Hampshire public district schools for about fifteen months; principal of the high school in Laconia 1880–82; and teacher, 1882–89, and preceptress, 1889–90, New Hampton Literary Institution and Commercial College.

Robinson entered Oberlin College at age thirty-two in 1890 and graduated four years later having done her major studies in mathematics. While at Oberlin, she was a leading member of a literary society, and "... her productions were acknowledged to be superior in thought and execution and in debate she was irresistible" (Berea College Archives). She was also a member of the First Congregational Church in Oberlin.

After graduating from Oberlin, Robinson was preceptress (instructor) at Kimball Union Academy in Meriden, New Hampshire, 1894–97, where her main duty was teaching Latin. She had been engaged in postgraduate work at Oberlin in Latin and German education when she was "called" to Berea College in Kentucky in 1897. Upon her arrival at Berea she taught Latin (Livy and Caesar), English literature, and mathematics. At Berea she was principal of the Ladies Department and acting professor of mathematics 1897–1901, dean of women 1901–07, and professor of mathematics 1901–11. During her tenure at Berea, the mathematics courses offered by Robinson and her colleagues, all of whom were male, were Arithmetic I, II, III; Algebra; Geometry; Trigonometry; Surveying; and Navigation. During the summers of 1907 to 1910 she studied at Dartmouth College and received a master's degree in mathematics in June 1911.

On February 1, 1911, in Berea, Kentucky, Josephine Robinson married Edward Drake Roe, Jr., a widower and mathematics professor at Syracuse University. E. D. Roe was born in Elmira, New York, on January 4, 1859. He earned bachelor's degrees from Syracuse in 1880 and Harvard in 1885 and a master's degree from

Harvard in 1886. He married Harriet Adelaide Bridge Gourley in 1890 and shortly thereafter adopted her daughter, Mary Eva Gourley (b. 1879). After teaching at Harvard and at Boston University, he went to Oberlin College as associate professor of mathematics in 1892, when Josephine Robinson was in her third year there. He was granted a leave 1897–99, studied at Erlangen 1897–98, and received a PhD from there in 1898 having worked with Paul Gordan. His first wife died in 1898, and he remained on the faculty at Oberlin until the end of his leave in 1899. E. D. Roe was on the faculty at Syracuse University from 1900 until his death twenty-nine years later. In 1901 he was appointed to the John Raymond French chair of mathematics, and in 1919 he was appointed director of the Holden Observatory at Syracuse; he also served as head of the mathematics department. He built a private observatory at his home and was the founder of the national honorary mathematics society Pi Mu Epsilon in 1914.

After her marriage in February 1911, Josephine Robinson Roe left Berea College and moved to Syracuse, where she subsequently engaged in graduate studies in mathematics. In 1918, at age sixty, she received a PhD from Syracuse University with a dissertation that she began with the statement: "This investigation is a continuation of published work of Professor E.D. Roe, Jr., to whom I am greatly indebted for assistance and advice." She taught as assistant professor at Syracuse in 1920; when she joined the MAA in 1934 she listed herself as assistant professor, retired. E. D. Roe died suddenly from a heart attack at their home on December 11, 1929, less than a month before his seventy-first birthday. In 1931 Josephine Roe had her dissertation printed in two parts, the second of which reproduced tables whose plates had been prepared by a student; the printed versions were referenced in mathematical and statistical literature at least through 1961.

In response to an inquiry from Helen Owens, Roe wrote on her questionnaire in 1940 that she was a Methodist and a Republican. She listed her honors as Phi Beta Kappa, Phi Kappa Phi, and Sigma Xi, and indicated that she was a fellow of AAAS. She noted that she was a life member of the AMS and also of the American Astronomical Society. She wrote that she "assisted [her] husband somewhat in his private Observatory in [their] residence. [She was] interested in birds and wild flowers, housekeeping, support of Christian missions at home and abroad, and of temperance work. A lover of travels, a wide reader. Have been active in Daughters of the American Revolution. Especially interested in people, just people, everywhere. A firm believer in immortality." Josephine Robinson Roe died in Newton Center, Massachusetts, in April 1946, shortly before her eighty-eighth birthday.

Organizational affiliations: AMS, Amer. Astron. Soc., AAAS (fellow), Phi Beta Kappa, Sigma Xi.

Dissertation:

1918 Interfunctional expressibility problems of symmetric functions *and* Interfunctional expressibility tables of symmetric functions. PhD dissertation, Syracuse University, directed by Edward Drake Roe, Jr. Printed version of first part, 1931, Cambridge, MA; printed version of second part, 1931, Syracuse, NY, distributed by Syracuse University.

Abstracts:

1917 Interfunctional expressibility problems of symmetric functions. *Bull. Amer. Math. Soc.* 23:158–59 #1. Presented to the AMS, New York City, 28 Oct 1916. Based on first part of PhD dissertation. Review of abstract: *JFM* 46.0165.05 (G. Szegö).

1917 Interfunctional expressibility problems of symmetric functions. Second paper. *Bull. Amer. Math. Soc.* 24:70 #24. Presented by E. D. Roe, Jr., to the AMS, Cleveland, OH, 5 Sep 1917. Based on first part of PhD dissertation.
1918 Interfunctional expressibility problems of symmetric functions (third paper). *Bull. Amer. Math. Soc.* 25:55 #11. Presented to the AMS, Hanover, NH, 5 Sep 1918. Based on first part of PhD dissertation.

References to: AmMSc 3–7, BiDWSci.

Other sources: Owens questionnaires 1937, 1940; Owens Papers; Gordon-Nash Library, New Hampton, NH; Meredith, NH, Public Library; New Hampton School, New Hampton, NH; communications with Berea College Archives, Dartmouth College Archives, and with Oberlin College Alumni Association; John C. Gowan and Pauline Swain Merrill, *Genealogy of the Town of New Hampton, New Hampshire* (New Hampton, NH: Gordan-Nash Library, 1940s); A. D. Campbell, "Edward Drake Roe, Jr.—In Memoriam," *Bull. Amer. Math. Soc.* 36 (1930): 161; WhAm 1 (Roe, Edward Drake, Jr.); US Census 1860, 1870, 1880, 1900 NH, 1910 KY, 1920, 1930 NY.

Last modified: March 8, 2009.

ROSENBAUM, Louise (Johnson). January 21, 1908–January 16, 1980.
University of Colorado (BA 1928, MA 1933, PhD 1939).

Laura Louise Johnson was born in Carrollton, Illinois, the youngest of five children of Ida Jane (Taylor) (1868–ca. 1940) and William Foster Johnson (1868–ca. 1939) of Illiniois. Her parents married in Illinois in June 1892, and all of their children were born there. They were Minnie E. (1893–1980), Mildred M. (1894–1983), Viola C. (1897–1970), Ebert Taylor (1899–1949), and Laura Louise, who was known as Louise. The family moved from Illinois to a farm outside of Boulder, Colorado, in about 1918, when Louise Johnson was ten. She attended country school through grade nine and at age thirteen moved by herself into Boulder in order to attend a school that offered a stronger preparatory program.

After completing high school at sixteen, Johnson entered the University of Colorado, where she did all of her undergraduate and graduate work. Burton W. Jones and Robert A. Rosenbaum recalled that her financial resources for her undergraduate work consisted of fifty dollars from her parents and her salary from a job as a checker in the university cafeteria during all her years as an undergraduate. They also reported that "she might have majored in geology if she could have afforded the laboratory and field trip fees" (Jones and Rosenbaum, 17).

Louise Johnson taught in high schools in eastern Colorado for two years after receiving her bachelor's degree in 1928. In May 1930 she was enumerated as a high school teacher in Armel in Yuma County. That autumn she returned to the University of Colorado and began her graduate studies working as an assistant in mathematics for at least two years and as an instructor in the extension division of the university most of the rest of the time she was there. "For administrative reasons, she was always described as a 'part-timer', even during those (rare) quarters when she taught 17 or 18 hours per week, the full-time load being 16 hours. With scrupulous attention, [Aubrey] Kempner saw to it that she received more than a full-time salary on such occasions" (Jones and Rosenbaum, 17). One year in the early 1930s she also taught mathematics at a Civilian Conservation Corps (CCC) camp, a considerable distance from Boulder. Johnson received her master's degree in 1933 after completing a thesis directed by Kempner, who also directed her doctoral dissertation in number theory. Paul Erdös wrote the review of the article based on her dissertation for the *Mathematical Reviews* and "became a good friend because of his interest in [her] results" (Rosenbaum correspondence 1998).

Johnson received one of two PhD's awarded in mathematics by Colorado in 1939. The other went to Marjorie Beaty. They were the fourth and fifth doctorates given in mathematics at Colorado since the first in 1906; the sixth was not awarded until 1951.

After Johnson finished her work for the PhD, "she was told by Kempner that there was really no future for her in Boulder since two of the four professorial members of the department were women" (Jones and Rosenbaum, 18). One of the women was Claribel Kendall, an associate professor and native of Colorado who had received a PhD from the University of Chicago in 1921. The other was Frances Stribic, an assistant professor who had completed all her work for a PhD except for her dissertation.

In the fall of 1939 Johnson was one of four fellows who had gone to Reed College in Portland, Oregon, to participate in a mathematics teaching seminar sponsored by

the General Education Board and run by Reed's Professor F. L. Griffin. One of the other teaching fellows that year was Robert A. Rosenbaum. Rosenbaum, who was born in 1915 in New Haven, Connecticut, shortly after his father, Joseph Rosenbaum, had earned a PhD in mathematics from Cornell, had earned his bachelor's degree from Yale in 1936. He had spent the year 1936–37 as a fellow of the Henry Fund in Cambridge. After the 1939–40 academic year both Johnson and Rosenbaum stayed on at Reed as instructors. They were married on August 1, 1942. R. A. Rosenbaum spent the next three years in the navy, while Louise Rosenbaum remained at Reed College, as instructor until 1943 and then as assistant professor after 1943. While he was a naval aviator in the Pacific, she "continued to teach at Reed, carrying a particularly heavy load in a military pre-meteorology program" (Jones and Rosenbaum, 18). She apparently did not spend the entire war years in Oregon, since she reported an address in Hollywood, Florida, in the 1944 MAA membership list. In F. L. Griffin's 1969 reminiscences he noted that when "the war was over ... Reed got our Bob and Louise Rosenbaum back, a great day for Reed" (466).

Robert Rosenbaum returned to Reed as assistant professor in 1945–46. He finished his PhD from Yale in 1947, returned to Reed as associate professor in the fall of 1947, and was promoted to professor in 1949. In 1950–51 he was a visiting professor at Swarthmore College. Louise and Robert Rosenbaum remained on the faculty at Reed until 1953, when Robert Rosenbaum joined the faculty at Wesleyan University in Middletown, Connecticut, as professor of mathematics. He later became dean of science, provost, academic vice president and provost, and acting president. In 1985 he was named University Professor of Mathematics and the Sciences, emeritus. During 1958–59 he was an NSF fellow at the Mathematics Institute at Oxford.

The Rosenbaums had three sons: Robert Johnson, Joseph Griffin, and David William, born in 1943, 1946, and 1948, respectively. Jones and Rosenbaum report that while the Rosenbaums were at Reed "despite the duties of a growing family ... there was no semester during which Louise did not teach at least one course" (18). They add that she also directed "notable undergraduate theses" and served on major college committees. After the Rosenbaums moved to Connecticut permanently in 1953, Louise Rosenbaum's regular teaching stopped. She had occasional visiting appointments at Trinity College in Hartford, Connecticut College in New London, and was a visiting faculty member at Smith College in 1973–74 when Robert Rosenbaum was a visiting professor at the nearby University of Massachusetts. She also was a professor at Saint Joseph College in West Hartford. She stayed active in mathematics education, serving on a committee of the School Mathematics Study Group (SMSG) and directing summer institutes for teachers in Connecticut and Oregon. During the 1950s and 1960s, she and her husband published, and revised several times, a pamphlet listing books appropriate for high school libraries. She also wrote a short book on mathematical induction.

Chief among Louise Rosenbaum's interests was hiking. While at Colorado she helped to arrange and guide tours of students into the mountains by bus or backpacking and climbed many of the high peaks of Colorado. She was also an expert skier, who skied in Colorado, Oregon, and Europe. Her husband reported that she became a member of the Society of Friends, "finding its philosophy, values, and social concerns particularly appealing" (Rosenbaum correspondence 1998).

Louise Rosenbaum died in Middletown, Connecticut, in 1980 shortly before her seventy-second birthday after having suffered from a progressive circulatory disorder for nearly a decade.

Organizational affiliations: AMS, MAA, AAUP, Phi Beta Kappa.

Thesis and dissertation:
1933 [Johnson, L. L.] On transfinite numbers. MA thesis, University of Colorado, directed by Aubrey John Kempner.
1939 [Johnson, L. L.] On the diophantine equation $x(x+1)\cdots(x+n-1) = y^k$. PhD dissertation, University of Colorado, directed by Aubrey John Kempner. See also **1940a**.

Publications:
1940a [Johnson, L. L.] On the diophantine equation $x(x+1)\cdots(x+n-1) = y^k$. *Amer. Math. Monthly* 47:280–89. Published version of PhD dissertation. Reviews: *JFM* 66.0147.03 (H. H. Ostmann); *MR* 1,291f (P. Erdös); *Zbl* 023.20502 (H. Rohrback). Presented to a meeting of the MAA, Laramie, WY, 28–29 Apr 1939; abstract: *Amer. Math. Monthly* 46:531 #2.
1940b with F. L. Griffin, H. E. Goheen, R. A. Rosenbaum, and H. Scheffé. *A Report on the Mathematics Teaching Seminar.* Reed College Bulletin, November.
1956 with R. A. Rosenbaum. *Bibliography of Mathematics for Secondary School Libraries.* Middletown, CT: Wesleyan University, Department of School Services and Publications. Second, third, fourth, and fifth eds.: 1957, 1959, 1961, and 1964. Microfilm of 5th ed.: 1969. Ann Arbor, MI: University Microfilms.
1966 *Induction in Mathematics.* Houghton Mifflin Mathematics Enrichment Series. Boston: Houghton Mifflin Co.

References to: AmMSc 7–8, 9P; BioWMath (Reprint of Jones and Rosenbaum 1982).
Jones, Burton W. and Robert A. Rosenbaum. "Louise Johnson Rosenbaum." *AWM Newsletter* 12 (Jul-Aug 1982): 16–19. Edited version in *Complexities: Women in Mathematics*, edited by Bettye Anne Case and Anne M. Leggett (Princeton: Princeton University Press, 2005), 202–04.

Other sources: Application for social security account 1951; communication with Robert A. Rosenbaum 1998; F. L. Griffin, "Some Teaching Reminiscences," *Amer. Math. Monthly* 76 (1969): 460–68; Jones and Thron, *A History of the Mathematics Departments of the University of Colorado*; WhoAm 40 (Rosenbaum, Robert Abraham); US Census 1900, 1910 IL, 1920, 1930 CO.

Last modified: July 20, 2009.

RUSK, Evelyn Carroll. September 28, 1898–December 5, 1964.
Wells College (BA 1920, MA 1922), Cornell University (PhD 1932).

Evelyn Teresa Carroll was the daughter of Teresa (Caraher) (1867–1930) and William J. Carroll (b. 1860), natives of New York. In June 1900 the family was living in Rome, New York, where she was born. At that time, her parents reported that they had been married thirteen years; her mother had had two children, although only Evelyn Carroll, then one year old, was living; and her father was owner of a knitting mill. In 1910 she had a six-year-old brother, William J. Jr. Although a birth year of 1900 for Evelyn Carroll appears in later documents, the 1900 census and corroborating evidence point to the 1898 date above as correct.

Evelyn T. Carroll received her preparation for college at Miss Lamphier's Private School and Rome Free Academy and then studied at Wells College, a women's college in Aurora, New York. After receiving her bachelor's degree in 1920, Carroll became an instructor at Wells; she also continued her studies there and received a master's degree in 1922. She was promoted to assistant professor in 1924 and served as acting head of the department 1924–25. She studied at Columbia University during the summer of 1924 and while on leave in 1927–28. Also in 1928 she worked for the General Motors Export Company. She studied at Cornell University 1929–31 and became associate professor at Wells upon her return in 1931, a semester before receiving her doctorate from Cornell in February 1932. She wrote her dissertation in geometry under the direction of Virgil Snyder and had minors in analysis and algebra.

Evelyn Carroll married William Sener Rusk, an art historian at Wells, in Aurora on August 31, 1932. William S. Rusk was born in Baltimore, Maryland, in 1892 and received a bachelor's degree from Princeton University in 1915. He later received a master's degree in 1924 and a PhD in 1933 from Johns Hopkins University. Rusk taught in preparatory schools before first joining the faculty at Wells College in 1921. He taught for three years, 1925–28, at Dartmouth College, before returning to Wells as professor of fine arts; he remained at Wells for thirty years until his retirement in 1968.

Evelyn Carroll Rusk was promoted to professor in 1934. She published several papers and one review under the name Evelyn Carroll-Rusk in the 1930s and used that form of her name in a few other professional contexts. She served as acting dean at Wells 1937–38 and became dean in 1938. While she was dean she was active in national and state associations for deans and was a member of the Cooperative Bureau for Teachers, where she was on the board 1938–51 and served as chairman of the board 1940–42. She remained as dean and professor until 1951, when she resigned the deanship and took a year's sabbatical to study mathematics curricula at colleges and universities in the United States. During this leave she held a fellowship from the Ford Foundation Fund for the Advancement of Education. After returning from her sabbatical year, Rusk returned to the mathematics department, and in 1954 she became chairman of the department.

Rusk was Roman Catholic and a Republican. In about 1940 she indicated that her favorite recreations were golf and bridge and that her hobby was dramatics. While at Wells she was very active in faculty theatre productions, one of which was "Hedda Gabler" in 1947–48. She served as chairman of the mathematics department until her death at age sixty-six of a heart attack in her home in Aurora in 1964. She

was survived by her husband and her brother. William Sener Rusk died in 1984. In 1970 the Evelyn Carroll Rusk '20 Theatre Series was funded by a student from the class of 1934.

Organizational affiliations: AMS, MAA, AAUW, AAUP, Academic Deans Assoc. of Amer. Colleges and Univ., Amer. Assoc. of Deans of Women, Phi Beta Kappa.

Dissertation:

1931 [Carroll, E. T.] Systems of involutorial birational transformations contained multiply in special linear line complexes. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1932, reprinted from *Amer. J. Math.* 54:707–17. PhD granted 1932.

Publications:

1932 [Carroll, E. T.] Systems of involutorial birational transformations contained multiply in special linear line complexes. *Amer. J. Math.* 54:707–17. Published version of PhD dissertation. Reviews: *JFM* 58.0678.03 (U. Graf); *Zbl* 005.37103 (O. Zariski).

1934 [Carroll-Rusk, E.] Cremona involutions defined by a pencil of cubic surfaces. *Amer. J. Math.* 56:96–108. Reviews: *JFM* 60.0559.03 (O. H. Keller); *Zbl* 008.32202 (E. G. Togliatti). Presented by title to the AMS, Atlantic City, NJ, 29 Dec 1932; abstract: *Bull. Amer. Math. Soc.* 39:34 #42.

1936a [Carroll-Rusk, E.] Review of *Spezielle algebraische Flächen.* a. *Flächen dritter Ordnung*; b. *Flächen vierter und höherer Ordnung.* In *Encyklopädie der mathematischen Wissenschaften mit Einschluss ihrer Anwendungen*, vol. 3, pt. 2, nos. 10 & 11, by W. Fr. Meyer. *Bull. Amer. Math. Soc.* 42 (1, pt. 2): 7–9.

1936b [Carroll-Rusk, E.] with V. Snyder. The Veneroni transformation in S_n. *Bull. Amer. Math. Soc.* 42:585–92. Reviews: *JFM* 62.0752.02 (E. A. Weiss); *Zbl* 015.04102 (E. G. Togliatti). Presented to the AMS by V. Snyder, Ann Arbor, MI, 11 Sep 1935; abstract: *Bull. Amer. Math. Soc.* 41:629 #327.

1937 [Carroll-Rusk, E.] with V. Snyder. A series of involutorial Cremona transformations in S_n belonging multiply to a non-linear line complex. *Amer. J. Math.* 59:775–82. Reviews: *JFM* 63.0606.03 (E. A. Weiss); *Zbl* 017.27902 (J. A. Todd). Presented to the AMS by V. Snyder, New York City, 27 Mar 1937; abstract: *Bull. Amer. Math. Soc.* 43:180 #149.

1939 [Carroll-Rusk, E.] with V. Snyder. A Cremona involution in S_3 without a surface of invariant points. *Bull. Amer. Math. Soc.* 45:141–44. Reviews: *JFM* 65.0710.04 (E. A. Weiss); *Zbl* 020.39302 (E. G. Togliatti). Presented to the AMS by V. Snyder, Charlottesville, VA, 16 Apr 1938; abstract: *Bull. Amer. Math. Soc.* 44:350–51 #265.

References to: AmMSc 5–8, 9P–10P; AmWom 1935–40; NatCAB 51; WhoAmW 2–4.
"Mrs. Rusk Wells College Dean." *New York Times*, 17 Jun 1938.
"Dean of Wells College Resigns, Effective July 1." *New York Times*, 9 Mar 1951.
"Dr. Evelyn C. Rusk, Professor at Wells." (Obituary) *New York Times*, 8 Dec 1964.

Other sources: PhD dissertation vita 1931; Owens questionnaires 1937, 1940; Center for Research Libraries College Catalog Collection; Cornell University Archives; communications with Florence Fasanelli (student of E. C. Rusk) and with Wells College Archives; WhoAm 40 (Rusk, William Sener); US Census 1900, 1910, 1920, 1930 NY.

Last modified: March 8, 2009.

RUSSELL, Helen G. September 28, 1901–October 24, 1968.
Wellesley College (BA 1921), Columbia University (Teachers College) (MA 1924), Radcliffe College (PhD 1932).

Helen Gertrude Russell was born in Gorham, Maine, the third of six children of Winifred Parker (Stone) (1869–1970) of Bucksport, Maine, and Walter Earle Russell (1869–1948) of Fayette, Maine. Her mother graduated from Maine Wesleyan Female College in Kent's Hill and taught at Bridgton Academy in North Bridgton, Maine, and at Miss Porter's School in Farmington, Connecticut, before her marriage in 1896. Her father, a graduate of Wesleyan University, was a faculty member and, for thirty-five years, principal of the Gorham Normal School, a predecessor of the University of Southern Maine. Her parents had three sons: Earl Stone (1897–1973), Willis Cleaves (1898–1986), and Robert Edward (b. 1906); their two other daughters were Muriel Lincoln, who was born in December 1904 and died in June 1905, and Celia Asenath (1909–1995). Her two older brothers both received PhDs: Earle in education from Yale in 1934 and Willis in history from American University in 1932. It was reported in a genealogy published in 1926 that Robert was in the Wesleyan class of 1927 and that Celia was in the Wellesley class of 1929.

Helen Russell attended Gorham schools before entering Wellesley College. After her college graduation in 1921, she taught mathematics and Latin in the high school in Mt. Holly, New Jersey, 1921–23, and mathematics in the Horace Mann School for Girls in New York City 1923–27. She earned a master's degree from Teachers College, Columbia, in 1924. For two issues of the 1924 *Mathematics Teacher*, the sections on mathematics clubs were prepared by Russell and four other members of David Eugene Smith's 1923–24 Teachers College class in teaching mathematics in secondary schools.

Russell returned to Massachusetts in 1927 to continue her graduate work at Radcliffe College. She was also an instructor at Wellesley 1928–29. In a February 1930 letter to David Eugene Smith regarding a reference for a Radcliffe scholarship, Russell wrote from Cambridge, "Three years ago I left Horace Mann School to come here to do graduate work in mathematics. Last year I taught two freshman classes at Wellesley and consequently did very little work at Radcliffe. This year I am again doing full time work" (Professional Correspondence, David Eugene Smith Professional Collection, Archival Collections, Rare Book and Manuscript Library, Columbia University Libraries). She completed her work at Radcliffe in 1932. Her dissertation in analysis was directed by J. L. Walsh, and a paper she coauthored with him bearing the title of her dissertation appeared the following year in the *Transactions* of the AMS. Her collaboration with Walsh, who had received his doctorate from Harvard a dozen years earlier and spent most of his career as a faculty member there, continued for more than thirty years.

Russell again joined the mathematics department at Wellesley in 1932, the year Helen Abbot Merrill retired after nearly forty years on the faculty, the last sixteen as department chairman. Russell remained at Wellesley for the rest of her career except for leaves. She was instructor 1932–36, assistant professor 1936–45, associate professor 1945–51, professor 1951–66, and emeritus professor after her retirement in 1966. She was also named chairman in 1952 and the Helen Day Gould professor of mathematics in 1955; she held that professorship until her retirement.

While at Wellesley, Russell continued her research in complex analysis and contributed research articles and reviews to journals. She took several leaves, possibly all sabbaticals; the first, in 1942–43, was at the University of California. Her next three leaves were all at Harvard. The first of these was during the first semester of 1949–50 when she worked at Widener Library and audited a course with Oscar Zariski. Her next two leaves were in 1956–57 and in 1963–64. During her last leave she was a research fellow in mathematics. After each of these leaves Russell published a paper jointly with J. L. Walsh. The last of these papers appeared in 1966, the year they both retired. This last joint paper was the second part of a paper first published by Walsh the previous year.

Russell was also an active participant in college committee work and other extracurricular activities. At various times she served on the board of admission and on the administrative board. She was also a member of committees on scholarships; student records; curriculum and instruction; the library; war activities; nominations; reappointments, promotions and dismissals; and appointments. She participated in the Shop Club, the Chapel Board, and the General Court, and was a class dean.

Her professional activities included serving on the council of the Association of Teachers of Mathematics in New England and on a committee on summer institutes for mathematics teachers. She was a member of the entertainment committee for various meetings, including the International Mathematical Congress in Cambridge, Massachusetts, in 1950. She was also on a committee on a cooperative Harvard plan for the preparation of teachers.

Russell was a Radcliffe alumna member of Phi Beta Kappa and held offices in the Wellesley chapters of Phi Beta Kappa, Sigma Xi, and AAUP. She was a Republican and a Methodist. She was an enthusiastic traveler, whose trips included travel in Europe in 1925 and 1927, in the western United States in the summers of 1937 and 1939, and in the Orient in 1963–64 with her mother who was then ninety-five.

Helen G. Russell died in 1968 at age sixty-seven in Portland, Maine, after a brief illness. She was survived by her mother, three brothers, and her sister, and is buried in Eastern Cemetery in Gorham.

Organizational affiliations: AMS, MAA, AAUP, Phi Beta Kappa, Sigma Xi.

Dissertation:

1932 On the convergence and overconvergence of sequences of polynomials of best simultaneous approximation to several functions analytic in distinct regions. PhD dissertation, Radcliffe College, directed by Joseph Leonard Walsh. Summary: *Radcliffe College. Graduate School of Arts and Sciences. Summaries of Theses Accepted in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy* 1:60–62.

Publications:

1934 with J. L. Walsh. On the convergence and overconvergence of sequences of polynomials of best simultaneous approximation to several functions analytic in distinct regions. *Trans. Amer. Math. Soc.* 36:13–28. Reviews: *JFM* 60.0252.01 (W. Hahn); *Zbl* 008.21402 (G. Szegö). Presented by Russell to the AMS, New York City, 29 Oct 1932; abstract: *Bull. Amer. Math. Soc.* 38:490 #173.

1948a To young instructors of mathematics. *Math. Mag.* 22:54–55.

1948b Review of *Plane Trigonometry*, by E. B. Mode. *Math. Mag.* 21:270.

1949 with M. Stark and M. M. Young. Helen A. Merrill, '86. *Wellesley Alumnae Magazine* 33:353–54.

1950a with J. L. Walsh. On simultaneous interpolation and approximation by functions analytic in a given region. *Trans. Amer. Math. Soc.* 69:416–39. Reviews: *MR* 12,813d (H. Kober); *Zbl* 041.04102 (E. Ullrich).
1950b Review of *Analytic Geometry*, by W. A. Wilson and J. I Tracey. *Math. Mag.* 23:269–70.
1950c Review of *College Algebra*, by J. B. Rosenbach and E. A. Whitman. *Math. Mag.* 23:270.
1953a Review of *Analytic Geometry and Calculus*, by F. H. Miller. *Math. Mag.* 26:276.
1953b Review of *Calculus*, by J. V. McKelvey. *Math. Mag.* 26:232.
1954 Review of *A Refresher Course in Mathematics*, by F. J. Camm. *Sci. Monthly* 78:118–19.
1955 Review of *Fundamentals of College Mathematics*, by J. C. Brixey and R. V. Andree. *Sci. Monthly* 80:267.
1958 Review of *Plane Trigonometry*, by F. A. Rickey and J. P. Cole. *Amer. Math. Monthly* 65:639–40.
1959a with J. L. Walsh. Integrated continuity conditions and degree of approximation by polynomials or by bounded analytic functions. *Trans. Amer. Math. Soc.* 92:355–70. Reviews: *MR* 21 #7311 (J. Favard); *Zbl* 098.04901 (G. Bourion). Presented to the AMS, Chicago, 19 Apr 1958; abstract: *Notices Amer. Math. Soc.* 5:348.
1959b Review of *The Real Projective Plane*, 2nd ed., by H. S. M. Coxeter. *Scripta Math.* 24:162–63.
1961a Review of *Advanced Algebra, Part I*, by E. A. Maxwell. *Amer. Math. Monthly* 68:193–94.
1961b Review of *Modern Fundamentals of Algebra and Trigonometry*, by H. Sharp, Jr. *Amer. Math. Monthly* 68:683.
1964 The new mathematics. *Wellesley Alumnae Magazine* Oct.
1966 with J. L. Walsh. Hyperbolic capacity and interpolating rational functions II. *Duke Math. J.* 33:275–79. Reviews: *MR* 33 #1624 (Ch. Pommerenke); *Zbl* 148.30302 (H. Meschkowski). Part I by J. L. Walsh.

References to: AmMSc 6–8, 9P–11P; WhAm 5; WhoAmW 1–6.
"Helen G. Russell, Ex-Math Professor." *New York Times*, 26 Oct 1968.

Other sources: Owens questionnaire 1940; Archival Collections, Rare Book and Manuscript Library, Columbia University Libraries; Wellesley College Archives; Morris Marden, "Joseph L. Walsh, In Memoriam," *Bull. Amer. Math. Soc.* 81 (1975): 45–65; J. Gardner Bartlett, *Simon Stone Genealogy . . .* (Boston: Stone Family Association, 1926); US Census 1900, 1910, 1920, 1930 ME; SSDI.

Last modified: June 23, 2011.

SAGAL, Mary Helen (Sznyter). June 21, 1893–March 24, 1975.
University of California (BA 1915, MA 1916, PhD 1918).

Mary Helen Sznyter was born in Woodhaven, New York, the only surviving child of three children born to Mary (Mogilska) (b. 1864) and Valentine Sznyter (1851–1948), both natives of Poland. In 1900 the family was living in Withee, Wisconsin, where her father was a farmer. Her parents had been married twenty years, and her father had immigrated to the United States in 1890 and her mother in 1891. At some point the family moved to California.

Mary Helen Sznyter graduated from Berkeley High School in June 1911 and did all of her undergraduate and graduate work at the University of California in Berkeley, starting in 1911 as a student in social sciences. The following year, on November 2, 1912, she married John Boleslaw Sagal, then a student in commerce at the university. John Sagal was born in about 1887 in Bialystok, Poland, apparently with the family name of Sawoinewsky according to his draft registration form for World War I. He was in residence at the University of California for the first half of 1912–13, and his name does not appear in later catalogues of students. In 1917 he was a surveyor's helper, and in 1930 he was a civil engineer in Alameda County, California.

Mary Helen Sznyter continued to use the name Sznyter as a student and on her mathematical publications. By 1912–13 she had switched from social sciences to natural sciences, and for the year 1913–14 she held a Levi Strauss scholarship for the third congressional district. She received her bachelor's degree from the University of California in 1915. The following year she was a graduate student and a reader in mathematics. She completed the work for her master's degree in May 1916 with a master's thesis directed by J. H. McDonald. A paper based on her thesis appeared in the *Monthly* the following year. The Sagals' only child, a daughter, Bernice Elizabeth, was born on April 21, 1916, a month before her mother received her master's degree.

Sznyter continued her studies at California, with her major subject mathematics and her minor subject astronomy. In the former she had Theory of Algebraic Surfaces with D. N. Lehmer, Theory of Functions of a Complex Variable with B. M. Woods and F. Irwin, Logic of Mathematics with B. A. Bernstein, Seminar in Mathematics with McDonald, and Elliptic Functions with C. A. Noble. In her minor subject, she had courses in Theoretical Astronomy and in Celestial Mechanics with A. O. Leuschner. She was again a reader in mathematics 1917–18, her final year at the University of California.

According to the mathematics department at the University of California, Mary Helen Sznyter's dissertation advisor was J. H. McDonald who chaired the committee for her public final examination in May 1918. In her dissertation she expresses her gratitude to D. N. Lehmer "whose course on algebraic surfaces of three dimensional space served to arouse the interest in the study of such surfaces and has been a foundation for much that is included here."

At the time of the census in 1930, John and Mary Sagal were living in Eden Township in Alameda County, California, with their thirteen-year-old daughter and Mary Sagal's widowed mother. No occupation was indicated for Mary Sagal. Their daughter, Bernice, received both a bachelor's degree and a master's degree from the

University of California, Berkeley, married, and worked as a laboratory technician before her retirement. She died in 2004.

Mary Helen Sagal taught in the Chowchilla School District for about twenty-five years according to the report made by her daughter on the death certificate. She died in 1975 as a result of colon cancer at the Eden Hospital in Castro Valley, California. She was cremated, and her ashes were placed in Irvington Memorial Cemetery in Fremont. Her husband had died in 1968.

Thesis and dissertation:

1916 [Sznyter, M. H.] Some metrical properties of the pentahedroid in a space of four dimensions. MA thesis, University of California, directed by John Hector McDonald. Typescript. See also **1917**.

1918 [Sznyter, M. H.] The hypersurface of the second degree in four-dimensional space. PhD dissertation, University of California, directed by John Hector McDonald. Printed version, 1924, reprinted from *Univ. Calif. Publ. Math.* 2 (1): 1–18.

Publications:

1917 [Sznyter, M. H.] Some metrical properties of the pentahedroid in a space of four dimensions. *Amer. Math. Monthly* 24:113–19. Published version of MA thesis.

1924 [Sznyter, M. H.] The hypersurface of the second degree in four-dimensional space. *Univ. Calif. Publ. Math.* 2 (1): 1–18. Published version of PhD dissertation. Review: *JFM* 50.0440.01 (E. Salkowski).

Other sources: Program for PhD final examination 1918; application for social security number 1969; University of California Archives; communications with Alameda County Library and with University of California, Berkeley, Archives; US Census 1900 WI, 1930 CA; California death certificate.

Last modified: July 20, 2009.

SANDERSON, Mildred Leonora. May 12, 1889–October 15, 1914.
Mount Holyoke College (BA 1910), University of Chicago (MS 1911, PhD 1913).

Mildred Leonora Sanderson was born in Waltham, Massachusetts, the daughter of Edna E. Pratt (b. 1862) and Horace M. Sanderson (b. 1856), natives of Massachusetts. Her father was a florist and truck farmer. In the census of 1900, there were four children living of five born; her siblings were two older sisters, May E. (b. 1884) and Alice Gertrude (b. 1886), and a younger brother, Ralph H. (b. 1898). The household also listed two servants from Ireland: a farm laborer and one who did general housework.

Sanderson attended North Grammar School and Waltham High School, public schools in Waltham. After graduating from high school as valedictorian in 1906, Sanderson was a student at Mount Holyoke College until her graduation in 1910. At Mount Holyoke she earned general honors at the end of her sophomore year and honors in mathematics when she graduated. The year following her college graduation Sanderson studied at the University of Chicago as the holder of the Bardwell Memorial Fellowship from Mount Holyoke. She studied with E. H. Moore, L. E. Dickson, H. E. Slaught, W. D. Macmillan, G. A. Bliss, and A. S. Gale, and wrote her master's thesis under the direction of Dickson. During the next two years she also studied with F. R. Moulton, E. J. Wilczynski, K. Laves, and A. C. Lunn, and wrote her dissertation in the area of modular invariant theory, again advised by Dickson. She received her PhD with minor work in astronomy.

In his 1915 "Tribute" to Sanderson, Dickson described the work she did under his direction noting that her master's thesis on generalizations in the theory of numbers and theory of linear groups "might well have served for her doctor's thesis; but she was quite willing to undertake a new investigation in a wholly different field." About her doctoral dissertation he wrote, "This paper is a highly important contribution to this new field of work; its importance lies partly in the fact that it establishes a correspondence between modular and formal invariants. Her main theorem has already been frequently quoted on account of its fundamental character. Her proof is a remarkable piece of mathematics." E. T. Bell wrote in 1938 that "Miss Sanderson's single contribution (1913) to modular invariants has been rated by competent judges as one of the classics of the subject" (p. 22).

Sanderson was an instructor at the University of Wisconsin during the first semester 1913–14 but left in February 1914 when she became ill with pulmonary tuberculosis. She died at age twenty-five in a hospital in East Bridgewater, Massachusetts, the following October. Services were conducted in her family's home in Waltham by a paster of the First Baptist Church, and she was buried in Mt. Feake cemetery in Waltham. Writing a few months later in the *Monthly*, Dickson called her his "most gifted pupil." A Mildred L. Sanderson prize for excellence in mathematics was established in 1939 and is awarded annually by Mount Holyoke College.

Organizational affiliations: AMS, Phi Beta Kappa.

Thesis and dissertation:
1911 The general linear group with respect to a function and composite integer as moduli. MS thesis, University of Chicago, directed by Leonard Eugene Dickson. Typescript. See also **1911** in **Publications**.
1913 Formal modular invariants with application to binary modular covariants. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Reprinted from *Trans. Amer. Math. Soc.* 14:489–500.

Publications:
1911 Generalization in the theory of numbers and theory of linear groups. *Ann. of Math.* 2nd ser., 13:36–39. Published version of MS thesis. Reviews: *JFM* 42.0159.02 (F. Schur); *Rev. semestr. publ. math.* 20, pt. 2: 10 (W. A. Wythoff).
1913 Formal modular invariants with application to binary modular covariants. *Trans. Amer. Math. Soc.* 14:489–500. Published version of PhD dissertation. Reviews: *JFM* 44.0139.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 22, pt. 2: 6 (P. Mulder). Presented as "A fundamental theorem in the theory of modular invariants" to the AMS, Chicago, 21 Mar 1913; abstract: *Bull. Amer. Math. Soc.* 19:448 #9.

Abstract not listed above:
1914 A method of constructing binary modular covariants. *Bull. Amer. Math. Soc.* 20:76 #34. Presented to a meeting of the AMS, Madison, WI, 8–13 Sep 1913.

References to: BioWMath.
"Miss Mildred L. Sanderson." (Obituary) *Waltham Daily Free Press-Tribune*, 16 Oct 1914.
"Funeral of Miss Sanderson." *Waltham Evening News*, 16 Oct 1914.
Dickson, L. E. "A Tribute to Mildred Lenora [*sic*] Sanderson." *Amer. Math. Monthly* 22 (1915): 264. Reprint: *AWM Newsletter* 14 (Jul–Aug 1984): 16.

Other sources: MS thesis vita 1911; PhD dissertation vita 1913; communications with East Bridgewater, MA, town clerk and with Waltham, MA, Public Library; Bell, "Fifty Years of Algebra in America"; Green and LaDuke, "Contributors to American Mathematics"; US Census 1900, 1920 MA.

Last modified: December 17, 2010.

SCHULTE, Sister M. Leontius. September 4, 1901–March 20, 2000.
College of Saint Teresa (BA 1923), University of Michigan (MA 1931, PhD 1935).

Sister Mary Leontius Schulte was born Catherine Mary Schulte in Cleveland, Wisconsin, the youngest of seven surviving children of Mary (Wagner) (1862–1933) and Joseph Schulte (1860–1940), both natives of Wisconsin whose parents were born in Germany. Her parents had some grade school education and were married in 1885. Schulte remarked in a conversation with one of the authors in 1983 that her parents were farmers, that her father was good-natured and faithful, and that she owed everything to them. Her older siblings were Ella (or Eleanor) (1886–1985), Lucy (1888–1990), Peter (1890–1976), Margaret (1892–1983), Josephine (1895–1982), and Theodore (1897–1987).

Catherine Schulte attended primary school in Cleveland, Wisconsin, and graduated from high school in Manitowoc in 1919. That fall she entered the College of Saint Teresa in Winona, Minnesota, with the intention of studying home economics. However, she became interested in mathematics and received her bachelor's degree, with a major in chemistry and minors in mathematics, French, and English, in 1923.

After her graduation Schulte taught mathematics at high schools in Minnesota; she was at Holy Trinity High School in Rollingstone 1923–24, Saint John High School in Rochester 1924–26, and Saint John High School in Caledonia 1927–28. She entered the Sisters of Saint Frances in Rochester on January 19, 1926 and made her profession of vows in 1927.

Sister Mary Leontius Schulte began her graduate work at the University of Michigan in the summer session of 1928 and became an instructor at the College of Saint Teresa that fall. Sister M. Thomas à Kempis Kloyda, her slightly older colleague at the college, had a similar educational and professional history. She, too, had been an undergraduate at the College of Saint Teresa; she did graduate work at Michigan and then joined the faculty at the college in 1926. Both would earn their doctorates at Michigan and spend the major part of their careers at the College of Saint Teresa.

Sister M. Leontius took graduate courses in mathematics and physics during the four summers of 1928–31 and received her master's degree in September 1931. She continued teaching except for the two academic years 1932–34, when she was in residence full time at the University of Michigan to finish the course work for her PhD. During these two years she lived at Mercy Hospital in Ann Arbor. Her dissertation in the history of mathematics, like that of Sister M. Thomas à Kempis, was directed by Louis C. Karpinski. She was enrolled during the summer of 1934, when the dissertation was accepted, and the degree was conferred in March 1935.

Sister M. Leontius was instructor and associate professor at the College of Saint Teresa until 1948 when she was promoted to full professor. She retired as professor emeritus in 1975. During her years on the faculty she was particularly involved with issues concerning mathematics education and gave several talks to the elementary and junior high school sections of NCTM. She was a participant at NSF institutes and conferences at Ball State Teachers College 1959, Montclair State College 1961, Oklahoma State University 1961, Washington State University 1962, and Teachers

College, Columbia, 1969. In the summer of 1966 she attended a Cuisenaire workshop in Denver.

Sister Leontius did a television series of nineteen telecasts, *Parents Ask About Arithmetic*, that were shown on KROC in Rochester in 1961–62, and fifteen kinescope recordings, *Teaching Mathematics K–6*, on KTCA in St. Paul the next year. For the latter she prepared a Teachers Manual K–6, 1963. In the 1980s materials from the programs were in the archives at the college. She credited Sister Thomas à Kempis with the pioneering idea of presenting mathematics on television.

Among the mathematics and educational organizations in which Sister Leontius participated were NCTM; the Minnesota Council of Teachers of Mathematics, where she served as a district board member 1970–75; South Eastern Minnesota Teachers of Mathematics; MAA, where she was on the executive committee of the Minnesota Section 1953–54 and 1955–56 and was chairman of the section 1954–55; and the Minnesota Education Association.

In college Sister Leontius liked athletics and played hockey, tennis, and basketball. As a faculty member she was involved with the mathematics club and was a sponsor of the Legion of Mary, which ministered to the sick; she served as a pastoral minister and visited shut-ins. In the 1983 conversation she remarked that listening to music was one of her pleasures.

Sister Leontius received an alumnae citation from the College of Saint Teresa in 1973. She remained there for several years after her retirement and did volunteer work in the college offices. The College of Saint Teresa closed in 1987, and the campus was purchased by a non-profit charitable foundation. Sister Leontius then lived at the Motherhouse, Assisi Heights, Rochester, Minnesota. She died in 2000 at age ninety-eight in Rochester and was buried in Calvary Cemetery in Rochester.

Organizational affiliations: MAA, NCTM, Sigma Xi.

Dissertation:

1934 Additions in arithmetic, 1483–1700, to the sources of Cajori's "History of Mathematical Notations" and Tropfke's "Geschichte der Elementar-Mathematik." PhD dissertation, University of Michigan, directed by Louis Charles Karpinski. Printed by Edwards Brothers, Ann Arbor, MI. PhD granted 1935. Reviews: *Isis Critical Bibliography* 24:27 (G. Sarton); *JFM* 61.0005.03 (H. Grunsky). See also **2015**.

Publications:

1940 Extra-curricular mathematical activities in secondary schools. *Math. Teacher* 33:32–34. Review: *The School Review* 49 #360.

2015 *Writing the History of Mathematical Notation: 1483–1700.* Boston: Docent Press. Published version of PhD dissertation with an introduction by Albrecht Heeffer and bibliographic notes by Douglas R. Furman.

Presentations not listed above:

[Leontius, Sister M.] Parents ask about arithmetic. Presented to the NCTM, Madison, WI, 15 Aug 1962.

A new look at old topics. Presented to the NCTM, Minneapolis, 20 Aug 1964.

Operation star: students develop new mathematical systems. Presented to the NCTM, Cedar Rapids, IA, 22 Aug 1968.

Early experiences in logic. Presented to the NCTM, Duluth, MN, 27 Aug 1971.

Reference to: OutEdAm 1975.

"Schulte, Sister Leontius." (Obituary) *Winona Post*, 26 Mar 2000.

Other sources: Owens questionnaire 1940; Smithsonian questionnaire 1983; Religious Women in Mathematics survey 1983; conversation with author and Uta C. Merzbach, June 24, 1983, Winona, MN; University of Michigan Alumni Records Office; University of

Michigan Graduate School; communication with Sisters of Saint Francis, Rochester, MN; US Census 1900, 1910, 1920 WI; SSDI.

Last modified: September 23, 2015.

SEDGEWICK, Rose (Whelan). June 16, 1903–June 7, 2000.
Brown University (Women's College) (PhB 1925), Brown University (MA 1927, PhD 1929).

Rose Alice Whelan was born in Brockton, Massachusetts, the fifth of six children of Mary Theresa (Manchester) (1864–1942) and Daniel Edward Whelan (1868–1955). Her mother was born in Liverpool, England, immigrated to the United States in 1868, and was naturalized in 1892. Mary Whelan had no formal higher education but loved reading, music, and theater; she handled the family finances and, according to her granddaughter Norma Sedgewick Rockel, "managed to find the money needed to give her children a higher education." Daniel Whelan was born in Massachusetts, and his formal education stopped at two years of high school; he was, however, "an omnivorous reader with wide ranging interests" (Rockel correspondence). He worked, mainly as a cutter, in a shoe factory. Norma Rockel also provided a detailed account of the other children in the family. They were Louise Manchester (1894–1984), who earned a bachelor's degree from Teachers College, Columbia University, and taught school in Massachusetts and New Jersey; Elizabeth Harford (1896–1974), who earned a BA and an MA in Guidance from Boston University and taught school in Brockton, Massachusetts; Daniel Edward Jr. (1897–1974), who earned a degree in civil engineering from Massachusetts Institute of Technology and became dean of science at Loyola University in Los Angeles; John Henry (1900–1926), who went to sea for several years and died at age twenty-six; and Mary (1907–2000), who earned a BA from Brown University and an MA from Teachers College, Columbia University, and taught in Maryland and New Jersey.

Rose Whelan received her primary and secondary education in the public schools of Brockton, Massachusetts. While there she received the Benjamin Franklin Medal for excellence in American history, an award that her grandmother, Johanna Louney, had received. After her graduation from Brockton High School in 1921, Whelan entered Women's College in Brown University (Pembroke College in Brown University from 1928 until it merged with Brown in 1971). She received the PhB magna cum laude in 1925, having been elected to Phi Beta Kappa in her junior year.

Whelan remained at Brown University during 1925–26, as a part-time assistant in the mathematics department and as a graduate student in mathematics. She taught in the Women's College before completing the work for her master's degree in September 1926. She received the degree in 1927, after having spent the academic year 1926–27 as a resident fellow at Bryn Mawr College working primarily with Anna Pell Wheeler. A February 1928 statement of the Department of Mathematics at Brown regarding Whelan contains a quotation from Wheeler. "Miss Rose Whelan took two courses with me at Bryn Mawr College during the year '26–'27. I found her a keen, thorough student. She has a questioning mind, and insists on settling all details, but also gets a good grasp of the subject as a whole. It was a great pleasure to work with her. She will be a clear lecturer, and her personality will win her students. She is very attractive in appearance and she has good health. Her interest in Mathematics, and her capacity for work, speak well for her mathematical career in the future. I have great hopes for Miss Whelan" (R. G. D. Richardson folder, R. L. Moore Papers, Archives of American Mathematics). It was noted that she was offered reappointment at Bryn Mawr for the year 1927–28 and that she was

named an alternate for the Margaret E. Maltby fellowship of the AAUW. However, Whelan returned to Brown for the 1927–28 year as holder of the Arnold fellowship.

Whelan also taught a section of freshmen at Women's College while studying for her doctorate and writing her dissertation on boundary value problems in differential equations under the direction of J. D. Tamarkin. In a letter of February 1928, R. G. D. Richardson, head of the department and dean of the graduate school at Brown, observed that Whelan would probably be finished by September 1928, that the dissertation should be publishable, and also that she had taught three summers at her former high school in Brockton, Massachusetts. He wrote, "She is one of the promising young women in Mathematics in the country. I wish it were possible to keep her here, but there seems no opening commensurate with her abilities. The department recommends her unreservedly for any position for which her experience and training fit her" (R. G. D. Richardson folder, R. L. Moore Papers).

During 1928–29 Whelan was an instructor at the University of Rochester and was sufficiently near the completion of her doctoral work that an abbreviated version of her dissertation appeared in the *Bulletin* of the AMS in January 1929. Her 1929 degree was the first PhD in mathematics granted by Brown. After receiving her doctorate, Whelan continued to teach at the University of Rochester. She was an instructor until 1932 and an assistant professor 1932–34.

On December 25, 1932, Rose Whelan and Charles Hill Wallace Sedgewick were married in Brockton, Massachusetts. Charles H. W. Sedgewick was born in Nova Scotia on August 21, 1902. He had worked as a bookkeeper and teller for a bank in Nova Scotia from 1917 to 1921 and as a high school teacher for two years after completing his bachelor's degree at Dalhousie University in 1925. In 1927 Sedgewick went to Brown, where he was an assistant, instructor, and then fellowship holder until 1932. He received his master's degree in mathematics in 1930 and continued his studies there until 1932, when he accepted an instructorship at Connecticut Agricultural College (from 1933 Connecticut State College and since 1939 the University of Connecticut) at Storrs.

After their marriage Rose Sedgewick returned to her teaching position in Rochester, New York, and Charles Sedgewick returned to his position in Storrs, Connecticut. In October 1933 Mary Elizabeth (Malia), the first of their four children, was born in Willimantic, Connecticut, near Storrs. In 1934 C. H. W. Sedgewick received his PhD in mathematics from Brown, he was promoted to assistant professor at Connecticut, and Rose Sedgewick gave up her position at Rochester. Their three other children were also born in Willimantic. They are Norma Louise, born in December 1935; John, born in July 1940; and Robert, born in December 1946. All of the children earned bachelor's degrees: Malia from the University of Connecticut in 1956, Norma with a major in physics from Bryn Mawr in 1956, and John and Robert with mathematics majors from Brown in 1962 and 1968, respectively. Malia also earned an MA from Vanderbilt University and an EdD from the University of Hawaii in 1987, and Robert earned an MA from Brown in 1969 and a PhD from Stanford in 1975. All have had careers: Malia as a professor of nursing, Norma as an electronic systems engineer, John as a mathematician, and Robert as professor of computer science.

Charles Sedgewick remained at the University of Connecticut until 1958. He was assistant professor 1934–41, associate professor 1941–46, and professor 1946–58. Rose Sedgewick was an instructor at Connecticut for some years beginning in 1943

and ending in 1956. She also taught at Hillyer College (now part of the University of Hartford) 1955–58.

In 1958 C. H. W. Sedgewick moved to the US Census Bureau in Suitland, Maryland, where he was a member of the staff of the industrial division 1958–61, chief of the foods section 1961–70, and supervisor of statistics from 1970 until his retirement. Rose W. Sedgewick was hired as an instructor at the University of Maryland in 1958 and was promoted to assistant professor in 1961; she retired at that rank in 1969.

The Sedgewicks' daughter, Norma, wrote in 2000 that her parents played contract bridge and were both life masters in the American Contract Bridge League. She also wrote that her mother "was an avid reader, as were all the Whelans, and read a book almost every day, even well into her 90s."

The Sedgewicks moved from Maryland to Dunedin, on the west coast of Florida, in 1971. Two of Rose Sedgewick's sisters, Louise Whelan and Mary Whelan, also eventually retired to Dunedin; Louise died there in 1984. Charles H. W. Sedgewick died in Dunedin at the age of eighty-six on November 5, 1988.

Rose W. Sedgewick was living at the Mease Continuing Care facility in Dunedin where she died suddenly of a heart attack in June 2000, shortly before her ninety-seventh birthday. Her sister Mary had died in the same facility just six weeks earlier. Rose Sedgewick was a member of St. Michael the Archangel Catholic Church in nearby Clearwater, Florida. She was survived by her four children and ten grandchildren. In October 2001, the Rose Whelan Society was founded at Brown University as an organization for women graduate students and postdoctoral appointees in mathematics and applied mathematics.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1927 [Whelan, R. A.] Analogies between the solutions of second order differential equations and the corresponding linear equations. MA thesis, Brown University. Typescript.
1929 [Whelan, R. A.] Approximate solutions of certain general types of boundary value problems from the standpoint of integral equations. PhD dissertation, Brown University, directed by Jacob David Tamarkin. Typescript. Abbreviated version, 1929, reprinted from *Bull. Amer. Math. Soc.* 35:105–22.

Publication:
1929 [Whelan, R.] Approximate solutions of certain general types of boundary problems from the standpoint of integral equations. *Bull. Amer. Math. Soc.* 35:105–22. Published version of PhD dissertation. Reviews: *JFM* 55.0257.04 (Fr. Willers); *Rev. semestr. publ. math.* 35:14 (D. J. Korteweg). Presented as "Approximate solutions of certain general types of boundary value problems from the standpoint of integral equations" to the AMS, Amherst, MA, 7 Sep 1928; abstract: *Bull. Amer. Math. Soc.* 34:706 #49.

References to: AmMSc 5–6.
"Rose Whelan Sedgewick, Mathematics Professor." (Obituary) *Washington Post*, 19 Jun 2000.
"Sedgewick, Rose Whelan." (Death notice) *Hartford* (*CT*) *Courant*, 15 Jun 2000.
"Sedgewick, Rose Alice Whelan." (Obituary) *Clearwater* (*FL*) *Times*, 13 Jun 2000.

Other sources: PhD dissertation vita 1929; communication with daughter Norma Sedgewick Rockel 2000; Archives of American Mathematics, Center for American History, The

University of Texas at Austin (R. L. Moore Papers); Brown University Archives; Bryn Mawr College Archives; communication with University of Maryland Archives; US Census 1900, 1910, 1920 MA; SSDI.

Last modified: August 6, 2009.

SEELY, Caroline E. August 3, 1887–May 17, 1961.
Barnard College (BA 1911), Columbia University (MA 1912, PhD 1915).

Caroline Eustis Seely was born in Delhi, New York, the daughter of Sarah Augusta (Wheeler), born in 1846 in Delhi, New York, and Henry Bates Seely, born in 1838 in Seneca Falls, New York. Her parents married in about 1870 and had four children: Carleton H. (ca. 1872–1885), Annie (b. ca. 1874), Mary (b. 1879), and Caroline. Her mother was from a Delhi professional family; Caroline's maternal grandfather was an attorney in Delhi and in Chicago. Caroline Seely's father was a naval officer who had graduated from the US Naval Academy in 1857. Before her birth he served on a number of ships, one of which was part of the South Atlantic blockading squadron early in the Civil War. After 1864 he commanded several ships and later the Ajax, European, and South Atlantic squadrons. In 1880 Henry Seely, convalescing from typhoid, was living with his wife and three children at the home of his mother-in-law in Delphi. From 1884 until 1891 he was captain, and then commandant, of the League Island Navy Yard in Philadelphia. He commanded a ship from March 1891 until 1892, after which he was retired. In 1900 the Seely family was living in Philadelphia. Henry Seely died there in 1901 when Caroline was thirteen.

In 1910 Caroline Seely and her widowed mother were living in New York City, where Caroline Seely was attending Barnard College, from which she graduated with honors in mathematics in 1911. She then did graduate work at Columbia University and served as an assistant in mathematics to David Eugene Smith at Teachers College, Columbia, in 1911–13. Seely had taken two courses from Smith as an undergraduate: theory and practice of teaching mathematics during the summer of 1910 and history of mathematics in 1910–11. She received her master's degree in 1912 with a thesis in analysis and continued her graduate work in mathematics at Columbia. Her doctoral dissertation, directed by Edward Kasner, was completed in 1914, and the degree was awarded by Columbia the following year.

In 1913 Seely began a twenty-two year association with the American Mathematical Society when she became the first mathematician to be employed full time by the society. Her first position with the AMS was clerical and editorial assistant. She wrote to David Eugene Smith in the fall of 1913 that she was "enjoying her new work very much, thanks to [him], but [was] afraid she [would] be rather homesick for Teachers College ..." (Professional Correspondence, David Eugene Smith Professional Collection, Archival Collections, Rare Book and Manuscript Library, Columbia University Libraries). Frank Nelson Cole, professor at Columbia and Barnard and secretary of the AMS since 1895, was editor-in-chief of the *Bulletin* of the AMS from 1899 until his resignation as secretary of the society in 1920. In addition to Seely's duties involving work of the society as clerk to Cole, she was engaged in editorial work for the *Bulletin* and the *Transactions* of the AMS. Seely continued her work with the society when R. G. D. Richardson of Brown replaced Cole as secretary in 1920. Seely was officially associate editor of the *Bulletin* 1925–34 and was cooperating editor of the *Transactions* 1924–36.

Seely lived in New York City, where she worked for the AMS and served as secretary to Cole at Columbia. During World War I, she was associated with F. R. Moulton and worked with the Army Ordnance Department in Washington, D.C. She continued her mathematical research in analysis during and after the war. In

1918 she prepared a *Union List of Mathematical Periodicals* for the Bureau of Education with David Eugene Smith.

At some point in 1934, Seely submitted her resignation to the AMS. In October 1934, J. R. Kline, an associate secretary of the society, reporting for a committee to study problems of the New York office, wrote to the council of the AMS, "The committee used all efforts within the dignity of the Society to secure the withdrawal of this resignation, but without success" (T. H. Hildebrandt Papers, Bentley Historical Library, University of Michigan).

In November 1934, Seely purchased nearly seventeen acres of land in the village of Willseyville in the town of Candor in Tioga County, New York, with the plan to retire the following spring. Seely wrote to D. E. Smith in November 1934, "Thanks very much for your kind letter; it is nice to feel that my first boss still remembers me. Yes, I am leaving the Society's office on April 1, to start a chicken farm; my friends tell me this is a very appropriate day for such a move. But most of them don't know New York State as well as you and I do, and don't realize how beautiful it is up there" (David Eugene Smith Professional Collection).

A year later she wrote to Smith, "It is lovely up here, and I enjoy being a farmer very much indeed. But it takes some time and money to get a farm in working order, and my part time job with the Transactions will run out this spring, with the completion of the first volume for 1936; I should have been glad if it had lasted a little longer, until my chickens are more steady on their feet. So if you hear of any text book work that you think I could handle, I should be glad if you would let me know" (David Eugene Smith Professional Collection).

Seely continued living in Willseyville most of the rest of her life. She died in 1961 at age seventy-three in a nursing home in nearby Ithaca and was buried in Woodland Cemetery in Delhi. She was survived by a niece, a nephew, and cousins.

Organizational affiliations: AMS, MAA, Phi Beta Kappa.

Thesis and dissertation:

1912 Refinements of the notion of limit prevailing in the modern theory of functions of a real variable. MA thesis, Columbia University.

1914 Certain non-linear integral equations. PhD dissertation, Columbia University, directed by Edward Kasner. Printed, 1914, Press of the New Era Printing Co., Lancaster, PA. PhD granted 1915.

Publications:

1916 (Translator from the French and German) The Mittag-Leffler Testament and Institute, by G. Mittag-Leffler. *Bull. Amer. Math. Soc.* 23:31–34. Review: *Rev. semestr. publ. math.* 25, pt. 2: 4 (D. J. Korteweg).

1918 with D. E. Smith. *Union List of Mathematical Periodicals*. Department of the Interior, Bureau of Education, Bull. 1918 no. 9. Washington: Government Printing Office. Review: Mathematical periodicals. *Bull. Amer. Math. Soc.* 25:134–37 (R. C. Archibald).

1919 Non-symmetric kernels of positive type. *Ann. of Math.* 2nd ser., 20:172–76. Reviews: *JFM* 46.0631.02 (M. Plancherel); *Rev. semestr. publ. math.* 28, pt. 1: 9 (W. A. Wythoff). Presented as "On kernels of positive type" to the AMS, New York City, 27 Apr 1918; abstract: *Bull. Amer. Math. Soc.* 24:470 #11.

1928 Kernels of positive type. *Ann. of Math.* 2nd ser., 29:313–18. Review: *JFM* 54.0417.01 (A. Hammerstein). Presented by title to the AMS, New York City, 29 Oct 1927; abstract: *Bull. Amer. Math. Soc.* 34:14 #48.

1930 Note on kernels of positive type. *Ann. of Math.* 2nd ser., 31:32–34. Review: *JFM* 56.1011.03 (A. Hammerstein). Presented by title to the AMS, New York City, 30 Mar 1929; abstract: *Bull. Amer. Math. Soc.* 35:445 #43.

1931 An existence theorem for characteristic constants of kernels of positive type. *Bull. Amer. Math. Soc.* 37:554–56. Reviews: *JFM* 57.0460.01 (M. Golumb); *Zbl* 002.26603 (G. Wiarda). Presented by title as "Note on kernels of positive type" to the AMS, Seattle, WA, 13 Jun 1931; abstract: *Bull. Amer. Math. Soc.* 37:523 #250.

Abstracts not listed above:
1915 Certain non-linear integral equations. *Bull. Amer. Math. Soc.* 21:277 #10. Based on PhD dissertation. Presented by title to the AMS, New York City, 1 Jan 1915.
1917 On series of biorthogonal functions. *Bull. Amer. Math. Soc.* 23:74–75 #34. Presented by title to a meeting of the AMS, Cambridge, MA, 4–8 Sept 1916.

Reference to: "Miss Caroline Eustis Seely." (Obituary) *Ithaca Journal*, 18 May 1961.

Other sources: PhD dissertation vita 1914; Owens questionnaire 1940; Archival Collections, Rare Book and Manuscript Library, Columbia University Libraries; Bentley Historical Library, University of Michigan (T. H. Hildebrandt Papers, 1887-1978); transcript of birth record; communications with Delaware County (NY) clerk, Tompkins County (NY) Public Library, and with Delores Vasilow (local researcher); TwCBDA 1904 (Seely, Henry B.); US Census 1880, 1910, 1920 NY, 1900 PA.

Last modified: March 26, 2009.

SHEA, Sister Ann Elizabeth. September 19, 1900–May 14, 1957.
University of Kansas (BA 1927), University of Wisconsin (MA 1931, PhD 1934).

Mary Gertrude Shea, known as Gertrude when she was young, was born and reared in St. Joseph, Missouri, the second of four children of Elizabeth (Raney), born in 1874 in Missouri, and Martin J. Shea (1864–1933), a native of Kentucky. In 1900 her parents, who at that time had been married four years, were living in St. Joseph with their two-year-old son. Also in the household were Elizabeth's mother and sister and Martin's sister. Martin Shea was a policeman. By 1910 all of the family's children were born: Gertrude's brother Lawrence was three years older than she; her brother Martin was two years younger; and her sister, Catherine, was seven years younger. Her father was a sergeant in the city police department.

In the 1920 census Gertrude Shea's occupation was listed as stenographer for a railroad clearing house. She entered the Novitiate of the Sisters of Charity of Leavenworth in 1922, made first vows in 1924, and was thereafter known as Sister Ann Elizabeth Shea. She graduated from the newly named Saint Mary College, a junior college for women in Leavenworth, Kansas, in 1923, the first year instruction at the postsecondary level was added. The school, which was chartered in 1860, was formerly St. Mary's Academy; in 2003 it became the University of Saint Mary.

After completing her bachelor's degree in 1927 at the University of Kansas, Sister Ann Elizabeth taught mathematics until 1930 at Immaculata High School in Leavenworth, Kansas. In 1930 she entered the University of Wisconsin to study for her master's degree. Department minutes of that period note that a master's thesis for her was considered optional; in February of 1931 the department considered, presumably favorably, her request for approval of the following courses to complete her master's degree: real variables (one year), algebraic geometry (one year), and higher algebra (first semester). She received the master's degree in 1931.

From 1931 until her death in 1957, Sister Ann Elizabeth was associated with Saint Mary College. The college, from which she had graduated in 1923, had just added an upper division curriculum in 1930 and became a four-year institution in 1932. From 1931 to 1933 she was instructor of mathematics. At the same time, she continued her graduate studies at the University of Wisconsin, where she was in residence 1933–34 and completed her work, including a dissertation in algebraic geometry under the direction of Theodore Bennett, in 1934.

After receiving her PhD, the first of the Sisters of Charity of Leavenworth to earn a doctorate, Sister Ann Elizabeth was professor and chairman of the mathematics department and later registrar of the college. In her latter role, she was also a member of the Association of Collegiate Registrars and the Kansas Association of Collegiate Registrars, for which she served as secretary. In 1940 she described her positions as registrar and chairman of the division of natural sciences and mathematics. She later became a member of the board of control of the college. She also taught in the summer of 1937 at Mount Mary College and in the summer of 1942 at Nazareth College. In the late 1930s and into the 1940s she attended meetings of the Kansas Section of the MAA.

In 1954 Sister Ann Elizabeth Shea was appointed treasurer-general of the corporation of the Sisters of Charity of Leavenworth. Her 1957 death in Leavenworth at age fifty-six from a cerebral hemorrhage was sudden and unexpected. Burial was

in Mount Olivet Cemetery on the Saint Mary grounds. She was survived by her younger sister, Catherine Shea, of St. Joseph, Missouri.

Organizational affiliations: MAA, NCTM, AAAS, Phi Beta Kappa.

Dissertation:
1934 Regular Cremona transformations in S_4. PhD dissertation, University of Wisconsin, directed by Theodore Lake Bennett. Typescript.

References to: AMSc 7.
"Member of Sisters of Charity Dies." *Leavenworth Times*, 15 May 1957.
"Sister Ann Shea Dies." *Kansas City Star*, 16 May 1957.
"Sister Ann Elizabeth, Nuns' Treasurer, Dies." *Eastern Kansas Register*, 24 May 1957.

Other sources: Owens questionnaires 1937, 1940; University of Wisconsin Archives; communication with Sisters of Charity of Leavenworth Archives; US Census 1900, 1910, 1920 MO.

Last modified: December 13, 2008.

SIMOND, Ruth G. March 7, 1904–September 15, 1958.
Boston University (BA 1927, MA 1929), University of Michigan (PhD 1938).

Ruth Gertrude Simond was the youngest of four surviving children, of five born, of Grace M. (Fifield) (1872–1967) and Walter A. Simond (1871–1962), both natives of New Hampshire who married in 1892. She was born in Franklin, New Hampshire. According to census records, in 1900 her father was a knitter of hosiery (a common occupation in Franklin at that time); he was described in 1910 as foreman of a hosiery mill, in 1920 as a draftsman in a machine shop, and in 1930 as a machinist in a hosiery mill. Her mother taught vocal and instrumental music. Her siblings were Flora (1894–1954), Maurice (1898–1990), and Marion (1901-1997).

Simond grew up in Franklin and presumably attended school there. She entered Boston University in 1923 and graduated in 1927. After receiving her bachelor's degree, she entered the Boston University graduate school, where she took courses in astrophysics, physical chemistry, and celestial mechanics as well as topics in advanced mathematics, curve tracing and graphical computation, the constructions of plane geometry, advanced calculus, and a survey of mathematics for teachers of elementary and secondary schools. It appears that she took one course in summer 1927, one in 1927–28, and the rest in 1928–29. She received her master's degree in June 1929 with a thesis on using graphic calculation in physical chemistry.

Simond was employed for the next four years. She classified mathematics books for the Harvard library during 1929–30. The next year she was an instructor at Hampton Institute (now Hampton University), one of the historically black colleges and universities in Virginia; it was called Hampton Normal and Agricultural Institute until 1930. She was a teacher at the Gorham (Maine) Normal School 1931–32 and returned to Hampton Institute as instructor for the school year 1932–33.

Ruth Simond began her graduate work at the University of Michigan in the summer of 1933 and was registered for courses throughout the academic years and summers until 1937. She was taking courses part time during the regular academic years 1934–35 through 1936–37. Her dissertation was supervised by W. L. Ayres, and the PhD degree was awarded in February 1938. Simond was in charge of the mathematics courses in the correspondence study department of the University of Michigan extension service 1936–38. During this period, she was among those who prepared or revised materials for supervised correspondence courses under the aegis of the Michigan Works Progress Administration (WPA). In 1936 she and one of her coauthors, Edith R. Schneckburger (PhD University of Michigan 1940), were the two nominees of the University of Michigan for membership in the AMS.

After leaving Michigan in 1938, Simond returned to Hampton Institute, where she was associate professor the next four years. She left in 1942, and a notation of "U.S. Navy Dept." was a part of her 1942 AMS membership listing. From August 1943 until March 1944, Simond taught in the Army Specialized Training Program at Heidelberg College in Tiffin, Ohio. During that year nearly 250 military men were added to the regular civilian enrollment of approximately the same number at the college, although the army required that the military and civilians could not be in the same classes. The 1944 AMS membership list has only an address in Baltimore for Simond. It is unclear exactly what Simond was doing during the two years 1942–43 and 1944–45. According to her obituary Simond was a cryptanalyst for the Navy Department in Washington during World War II, possibly during

1942–43. Relatives indicate that she also worked as a "Grey Lady" or nurse's aide during the war.

From September 1945 to June 1947 Simond was assistant professor at Berea College in Kentucky. She was originally invited to Berea to teach mathematics to members of the Navy V-12 unit there. The following year she taught at Morningside College in Sioux City, Iowa. In 1948 she was appointed assistant professor at the University of Vermont and State Agricultural College and remained in that position for the next decade.

Simond lived in Essex Junction, just outside Burlington, Vermont, and belonged to the Essex Junction Methodist Church. She taught through the spring semester 1958 and died in Burlington of complications from diabetes on September 15, 1958, at fifty-four. She was survived by her two sisters and her brother. Her body was interred in Community Cemetery in Franklin, New Hampshire.

Organizational affiliations: AMS, Sigma Xi.

Thesis and dissertation:

1929 Alignment charts and some applications to problems of physical chemistry. MA thesis, Boston University. Typescript.

1938 Relations between certain continuous transformations of sets. PhD dissertation, University of Michigan, directed by William Leake Ayres. Printed version, 1938, reprinted from *Duke Math. J.* 4:575–89.

Publications:

1937–39 with M. Hopkins and E. R. Schneckenburger. *Supervised Correspondence Study.* Ann Arbor: University of Michigan Extension Service. Pt. 1, 1937: College Algebra (M. Hopkins, rev. by R. G. Simond). Pt. 2, 1938: Plane Analytic Geomtery (R. G. Simond and E. R. Schneckenburger). Pt. 3, 1939: Conic Sections (R. G. Simond, rev. by E. R. Schneckenberger). Pt. 4, 1938: School Algebra (M. Hopkins). Pt. 5, 1938: Plane Trigonometry (R. G. Simond). Pt. 6, 1938: Solid Analytic Geometry (R. G. Simond).

1938 Relations between certain continuous transformations of sets. *Duke Math. J.* 4:575–89. Published version of PhD dissertation. Reviews: *JFM* 64.0624.02 (St. Golab); *Zbl* 019.33303 (G. T. Whyburn). Presented to the AMS, Chicago, 9 Apr 1937; abstract: *Bull. Amer. Math. Soc.* 43:199 #210.

Reference to:

"Miss Simond, Ex-Professor at UVM, Dies." *Burlington Free Press*, 16 Sep 1958.

Other sources: Owens questionnaire 1940; communication nephew Maurice H. Simond Jr. 1997; University of Michigan Alumni Records Office; University of Michigan Archives; communications with Berea College Archives, University of Vermont Archives, and Heidelberg College Archives; US Census 1900, 1910, 1920, 1930 NH; SSDI.

Last modified: December 13, 2008.

SINCLAIR, Mary E. September 27, 1878–June 3, 1955.
Oberlin College (BA 1900), University of Chicago (MA 1903, PhD 1908).

Mary Emily Sinclair was the fourth of five children of Marietta S. (Fletcher) (1840–1913), a native of Worcester, Massachusetts, and John Elbridge Sinclair (1838–1915), who was born in New Hampshire. Her parents met when, in 1869, they received the two new faculty appointments at the Worcester County Free Institute of Industrial Science (Worcester Polytechnic Institute after 1887) in Massachusetts, then a men's institution. The school had opened the previous year. Her mother, who had studied in France and Germany, was hired to teach English and modern languages. Her father, recently widowed and the father of two young daughters, arrived from Dartmouth College, where he had been on the mathematics faculty for the previous six years as associate professor 1863–66 and full professor 1866–69. He had received a BS from Dartmouth in 1858 and an MA from Washington University in 1862 and had taught at Adrian College and Washington University. Marietta Fletcher and John Sinclair married in November 1870, and Marietta Sinclair taught until 1872. Shortly thereafter their children were born; they were sons, Harry (1872–1934) and Luise Grant (1875–1950), and daughters, Alice (1876–1965), Mary Emily, and Helen Melora (1880–ca. 1968). Mary Emily Sinclair's older half-sisters were Annie, born in 1866, and Isabella, born in 1868. John E. Sinclair, who invented the ratchet wrench, remained on the faculty of Worcester Polytechnic Institute (WPI) for nearly forty years. The John E. Sinclair chair of mathematics, the first endowed professorship at WPI, was established in 1915 with a gift from John Sinclair and his children. John Sinclair made the gift to "show affection for the institute where in the early years Mrs. Sinclair and I taught together..." (R. L. Norton, "A Short History of Endowed Professorships at WPI").

Mary Emily Sinclair was born in Worcester, attended public schools there, and graduated in 1896 from Worcester Classical High School. She then attended Oberlin College and while there was a member of the LLS (Litterae laborum solanem, previously Ladies Literary Society) and president of the college YWCA. After receiving her undergraduate degree in 1900, she maintained her membership in the LLS Alumnae Association.

During 1900–01 Sinclair was an assistant teacher in Woodside Seminary, Hartford, Connecticut. She then studied at the University of Chicago and received her master's degree in 1903. Her master's thesis was accompanied by a thread model of a portion of the unbounded surface discussed in the thesis. Although the German firm of Martin Schilling listed her model among its new mathematical models in the December 1908 issue of the *Bulletin* of AMS (p. 147), no thread model appears to be extant. In 2003 a sculpture, "Quintic Discriminant I," of a portion of the surface was carved by Helaman Ferguson.

After receiving her master's degree, Sinclair taught in spring 1903 at Lake Erie College in Painesville, Ohio. During 1903–04 she held a fellowship at Chicago. The following year she went to the University of Nebraska as an instructor and remained there for three years.

In 1907 Sinclair was hired as an instructor at Oberlin College in Ohio, where she was to serve on the faculty for thirty-seven years. She received her doctorate from the University of Chicago in 1908, having written her dissertation in the calculus

of variations under the direction of Oskar Bolza, and was promoted to associate professor at Oberlin.

Sinclair spent her first sabbatical year, 1914–15, at Columbia University and Johns Hopkins University. During that period she adopted two children, Margaret Emily in 1914 and Richard Elbridge in 1915. Both were born in New York and were infants at the time of their adoption.

Sinclair spent the year 1922–23 as a Julia C. G. Piatt fellow of the AAUW, first at Cornell and then at Chicago. Her words of appreciation for this grant were quoted in a 1956 article in the AAUW journal. The year with this fellowship allowed Sinclair to resume her research in the calculus of variations, and she presented four papers on that topic in late 1923. In 1925 she was promoted to professor and spent a year's sabbatical in Rome and at the Sorbonne. In the summer of 1925, she visited in Freiburg with Oskar Bolza, her Chicago advisor, who had returned to Germany in 1910. She spent the year 1927–28 on leave from Oberlin at the University of Miami, Coral Gables, Florida. It appears that her daughter, Margaret, was at that time attending the Exmoor School there, and in the 1930 census, her son, Richard, was listed as a cadet at Miami Military Academy in Coral Gables. In spring 1935 she was on leave at the Institute for Advanced Study in Princeton, New Jersey. In 1939 she became head of the department, and, except for spending the second semester of 1941–42 on leave at Columbia, she remained in that position until she retired as professor emeritus in 1944, having been named Clark professor of mathematics in 1941. After retiring, she taught mathematics to Navy V-12 students part time at Berea College, Kentucky, 1944–46 and was listed in the Berea catalog as "worker under special agreement."

Sinclair was a charter member of the MAA and became active in the association soon after its beginning in 1915. She served on the auditing committee 1917–19 and was appointed librarian in 1918 and assistant librarian in 1922; she also held the latter position at least in 1924 and 1925. In 1924 she was appointed to a committee "to take under advisement the general problem as to how the Association can be of service to departments of mathematics in the various colleges, and in particular to formulate standards to which departments of mathematics should conform" (*Amer. Math. Monthly* 31 (1924): 166). Finally, she served as a member of the board of trustees 1936–38.

Soon after she retired from Oberlin, a Mary Emily Sinclair prize was established there. A faculty committee awarded the prize based on papers delivered to the college mathematics club. In recognition of the support given her by the AAUW, Sinclair contributed generously to their fellowship fund. She also contributed to Oberlin to allow for the establishment of a loan fund for women to use for professional reasons.

After spending 1944–46 in Kentucky, Sinclair returned to Ohio. On May 12, 1950, Mary Emily Sinclair was severely injured on the outskirts of Oberlin when she was beaten by a seventeen-year-old youth who took her car. Accounts over several weeks in the Elyria, Ohio, *Chronicle-Telegram* describe the beating and subsequent events. She suffered a skull fracture and a broken nose after having been beaten about the head with a heavy wire cutting tool. More than a month after the assault, she gave an account at the trial from a hospital cot accompanied by a nurse and two ambulance attendants; the attacker was convicted of armed robbery and sentenced to ten to twenty years in a reformatory.

In 1953 Sinclair moved to Belfast, Maine, where she made her home with her daughter-in-law, Myrtle Sinclair. Mary Emily Sinclair died in a hospital in Belfast at age seventy-six in 1955. Among survivors listed were her daughter, two sisters, six grandchildren, and several nieces and nephews. Interment was in Worcester, Massachusetts.

Organizational affiliations: AMS, MAA (charter member), AAAS (fellow), AAUW, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1903 Concerning the discriminantal surface for the quintic in the normal form: $u^5 + 10xu^3 + 5yu + z = 0$. MA thesis, University of Chicago. Typescript. See also **1908b**.

1908 Concerning a compound discontinuous solution in the problem of the surface of revolution of minimum area. PhD dissertation, University of Chicago, directed by Oskar Bolza. Printed version, 1909, Salem Press Co., Salem, MA, reprinted from *Ann. of Math.* 2nd ser., 10:55–80.

Publications:

1907 On the minimum surface of revolution in the case of one variable end-point. *Ann. of Math.* 2nd ser., 8:177–88. Reviews: *JFM* 38.0410.01 (R. Haussner); *Rev. semestr. publ. math.* 16, pt. 1: 12 (W. A. Wythoff).

1908a The absolute minimum in the problem of the surface of revolution of minimum area. *Ann. of Math.* 2nd ser., 9:151–55. Reviews: *JFM* 39.0444.02 (H. Hamburger); *Rev. semestr. publ. math.* 17, pt. 1: 11 (W. A. Wythoff). Presented as "On a discontinuous solution in the problem of the surface of revolution of minimum area" to the AMS, Ithaca, NY, 6 Sep 1907; abstract: *Bull. Amer. Math. Soc.* 14:68 #34.

1908b *Discriminantal Surface for the Quintic in the Normal Form* $u^5+10xu^3+5yu+z = 0$. Halle, Germany: Verlag von Martin Schilling. Pamphlet describing thread model accompanying MA thesis. Model listed as Nr. 1, Serie 33 ("Drei Faden-Modelle der Discriminantenfläche der Gleichungen vierten und fünften Grades"), *Catalog mathematischer Modelle.* Leipzig, Germany: Verlag von Martin Schilling, 94.

1909 Concerning a compound discontinuous solution in the problem of the surface of revolution of minimum area. *Ann. of Math.* 2nd ser., 10:55–80. Published version of PhD dissertation. Reviews: *JFM* 40.0705.01 (H. Jonas); *Rev. semestr. publ. math.* 17, pt. 2: 12 (W. A. Wythoff).

Abstracts not listed above:

1909 The problem of the surface of revolution with two end points variable on circles. *Bull. Amer. Math. Soc.* 15:287–88 #20. Presented to a meeting of the AMS, Baltimore, MD, 30–31 Dec 1908.

1922 Report on the Toronto meeting with special reference to "research problems for college teachers." *Amer. Math. Monthly* 29:196 #8. Presented to a meeting of the MAA, Columbus, OH, 14–15 Apr 1922.

1923 The brachistochrone with variable end points. *Bull. Amer. Math. Soc.* 29:438–39 #12. Presented to a meeting of the AMS, Poughkeepsie, NY, 6–7 Sep 1923.

1924a The hanging chain with endpoints variable on curves in a plane. *Bull. Amer. Math. Soc.* 30:222–23 #12. Presented to a meeting of the AMS, Cincinnati, OH, 28–29 Dec 1923.

1924b The isoperimetric problem with variable end points. *Bull. Amer. Math. Soc.* 30:222 #11. Presented to a meeting of the AMS, Cincinnati, OH, 28–29 Dec 1923.

1924c A research interest in the calculus of variations. *Amer. Math. Monthly* 31:162 #8. Presented to a meeting of the MAA, Cincinnati, OH, 27–28 Dec 1923.

1930 The mathematics club, its function and its vogue. *Amer. Math. Monthly* 37:272–73 #7. Presented to the MAA, Columbus, OH, 3 Apr 1930.

1936 *What* the mathematician explains. *Amer. Math. Monthly* 43:395 #11. Presented to the MAA, Columbus, OH, 2 Apr 1936.

Presentation not listed above:
Development of college mathematics in Ohio in the past fifty years. Part of round table discussion presented to the MAA, Columbus, OH, 6 Apr 1944.

References to: AmMSc 2–8, 9P; AmWom 1935–40; BiDWSci; BioWMath.
"Campus Personalities." *Oberlin Alumni Magazine*, May 1932, 239.
Parmenter, Ella C. "Oberlinian of the Month." *Oberlin Alumni Magazine*, June 1944, 4–5.
"Ex-Oberlin Professor Dies in Maine." *Elyria* (*OH*) *Chronicle-Telegram*, 4 Jun 1955.
"Dr. Mary E. Sinclair." (Obituary) *Belfast* (*ME*) *Republican Journal*, 9 Jun 1955.
"If the Good Luck Had Not Come to Me. . . " *J. Amer. Assoc. Univ. Women* 49, no. 3 (1956): inside back cover.
Sherman, Laurel G. "Mary Emily Sinclair (1878–1955)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 204–07. Westport, CT: Greenwood Press, 1987.

Other sources: Owens questionnaires 1937, 1940; Owens Papers; communications with Berea College Archives, Oberlin College Archives, and with Belfast (ME) Public Library; Gilbert Ames Bliss, *Calculus of Variations*, Carus Mathematical Monographs, Mathematical Association of America (Chicago and LaSalle, IL: Open Court Publishing Co., 1925); Green and LaDuke, "Contributors to American Mathematics"; Maltby, *History of the Fellowships*; Robert L. Norton, "A Short History of Endowed Professorships at WPI"; US Census 1850, 1870, 1880, 1900 MA; US Census 1920, 1930 OH; SSDI.

Last modified: January 16, 2016.

SMITH, Clara E. May 20, 1865–May 12, 1943.
Mount Holyoke College (BA 1902), Yale University (PhD 1904).

Clara Eliza Smith was born in Northford, Connecticut, the only child of Georgiana (Smith) (b. 1834) and Edward Smith (1832–1894), a farmer and cabinet maker in Northford. She was educated with private tutors and entered Mount Holyoke Female Seminary in 1882. She graduated in 1885, four years before the first bachelor's degree was awarded by Mount Holyoke and eight years before its present name was adopted. Letters from this period of her life have been deposited in the Mount Holyoke College library.

Smith attended the Yale School of the Fine Arts 1886–87 and 1888–89 after which she was a teacher of drawing and assistant in mathematics at the Bloomsburg Literary Institute and State Normal School (now Bloomsburg University of Pennsylvania) for eight years, 1889–97.

Smith entered the Yale graduate school in 1901 to study mathematics. At that point she had taken plane and solid geometry and plane and spherical trigonometry as requirements for her graduation from Mount Holyoke Seminary. She also studied higher algebra, analytic geometry, and calculus on her own. Smith was awarded a bachelor's degree from Mount Holyoke College in 1902 after passing an exam on one year's additional work in French and on the presentation of a certificate from Yale for courses in mathematics. Her graduate work at Yale in 1901–02 was in vector analysis with J. W. Gibbs, differential equations and function theory with J. P. Pierpont, differential geometry with W. A. Granville, and projective geometry with E. B. Wilson. The next year she had theory of functions of a complex variable with Pierpont, advanced analytic geometry with P. F. Smith, higher algebra with H. E. Hawkes, partial differential equations with E. R. Hedrick, and transformations of space with A. G. Gale. In 1903–04 she took theory of functions of a real variable with Pierpont, continuous groups with Smith, and elliptic functions with Hawkes. Clara Smith wrote her dissertation under the direction of James Pierpont, a native of New Haven, who had gone to Yale after several years of study in Europe, especially in Berlin and in Vienna, where he received his PhD in 1894.

Clara Smith received her PhD in 1904 and remained at Yale as a reader in mathematics for two years, after which she was an acting instructor at Wellesley College 1906–07. The following year she was an instructor at The Western College for Women in Oxford, Ohio. In 1908 she returned to Wellesley as assistant and, except for leaves, spent the rest of her career there. She was an instructor 1909–14, associate professor 1914–24, professor 1924–34, (some years as the Helen Day Gould Professor), and emeritus professor after her retirement in 1934. She had three leaves of absence: in 1911–12, during which she traveled, attended the September 1911 meeting of the German mathematical society, and studied one semester at the university in Göttingen; in 1918–19, when she was an exchange professor at Goucher College; and in 1926–27, when she made a trip around the world.

While at Wellesley, Smith coauthored two books with Helen A. Merrill; the first was "prepared for use in a required first-year course in Wellesley College" (p. iii) and was printed in 1914, and the second was published in 1917. Merrill was a long-time Wellesley faculty member who had earned her PhD from Yale a year before Smith, and who chaired the mathematics department from 1916 until her retirement in

1932. Smith was department chair for the following two years, 1932–34, before her own retirement.

Clara Smith served in a number of ways on the College Entrance Examination Board: as a reader starting in 1919, on a committee on revision, and on a board of examiners. She became a life member of the AMS, was permanent secretary of the membership committee during the 1920s, and was a trustee on the original board of the AMS in 1927, a thirty-one member body formed at the time of its incorporation. Smith and Anna J. Pell (Wheeler) of Bryn Mawr College were the only women on the board. Smith was a charter member of the MAA, served as a trustee 1923–25, and was vice president 1927. In a resolution voted on by the board of trustees at the annual meeting of the MAA, December 31, 1924–January 1, 1925, she was singled out for the efforts she made while she was in charge of a joint committee on membership of the AMS and the MAA. Her work for the AMS was also recognized in a resolution of the council in September 1925 and in one of several "resolutions on deaths of persons who have been prominent in the work of the Society" (*Bull. Amer. Math. Soc.* 49:827). That resolution read in part, "Much of the success of [the membership committee] was due to her laborious and painstaking assembling of data regarding teachers of college mathematics. On behalf of the Society, the Council wishes to acknowledge her loving interest in its welfare" (*Bull. Amer. Math. Soc.* 49:828).

Smith was a member of the Congregational Church. In 1923 she described her hobbies as "tramping and outdoor sports." In July 1927, she was severely injured in an automobile accident. A news item from February 21, 1935, noted that Lennie Phoebe Copeland and Clara Eliza Smith, retired head of the mathematics department, "sailed last week from New York for travel in the near east including Egypt, Palestine, Syria, Uganda, Turkey, Greece, and Italy" (Lennie P. Copeland folder, Wellesley College Archives). They were due back in June. Smith and Copeland, her long-time friend and colleague in the mathematics department, shared a home in Wellesley from the early 1920s. In her response to a request for information from Helen Owens in 1937, Copeland noted that she would be spending the summer "on Miss Smith's farm in the hills of Connecticut." They both attended the September 1937 AMS meeting in State College, Pennsylvania, where Smith was one of three guests of honor at a luncheon organized by Owens that was "held in honor of the women who were pioneers in mathematical research in America" (*Bull. Amer. Math. Soc.* 43:747).

In May 1943, shortly before her seventy-eighth birthday, Clara Eliza Smith died of a cerebral hemorrhage at her home in Wellesley. She is buried at the Northford Cemetery in Connecticut. She had no immediate survivors.

Organizational affiliations: AMS, MAA (charter member), AAAS (fellow).

Dissertation:

1904 Representation of an arbitrary function by means of Bessel's functions. PhD dissertation, Yale University, directed by James Pelham Pierpont. See also **1907**.

Publications:

1898 The geometry of Simpson's line. *Proc. Indiana Acad. Sci.* 101–17. Review: *Rev. semestr. publ. math.* 13, pt. 1: 14 (Ch. A. Scott).

1907 A theorem of Abel and its application to the development of a function in terms of Bessel's functions. *Trans. Amer. Math. Soc.* 8:92–106. Published version of PhD dissertation. Reviews: *JFM* 38.0490.01 (A. Wangerin); *Rev. semestr. publ. math.* 15, pt. 2: 12 (D. Coelingh). Presented to the AMS, New York City, 29 Dec 1905; abstract: *Bull. Amer.*

Math. Soc. 12:233 #18. Also presented as "Development of a function in terms of Bessel's functions (second paper)" to the AMS, New York City, 24 Feb 1906; abstract: *Bull. Amer. Math. Soc.* 12:329 #9.
1914 with H. A. Merrill. *Selected Topics in College Algebra*. Norwood, Mass.: Norwood Press.
1917 with H. A. Merrill. *A First Course in Higher Algebra*. New York: Macmillan Co. Reviews: *Amer. Math. Monthly* 25:72–74 (M. E. Wells); "College algebras," *Bull. Amer. Math. Soc.* 26:323–29 (E. B. Cowley); *Ed.* 38:354; *Nature* 100:263–64 (G. B. M.); *Sch. Sci. Math.* 17:756 (H. E. Cobb); *Science Progress* 12:684 (P. E. B. Jourdain).
1927 *A Brief Course in Trigonometry*. Ann Arbor, MI: Edwards Brothers.

Presentation not listed above:
The teaching of the subject of limits. Presented to the MAA, Baltimore, MD, 18 Jan 1919.

References to: AmMSc 2–6; BiDWSci; BioWMath; InSci; InWom.
Copeland, Lennie Phoebe. "Clara Eliza Smith–An Appreciation." *Wellesley Magazine*, June 1934, 431–32.
"Prof. Clara Smith of Wellesley, 78." (Obituary) *New York Times*, 14 May 1943.
"Clara Eliza Smith," *Yale Obituary Record* 1942–43.

Related manuscript material: Smith Family Papers, Mount Holyoke College, Archives and Special Collections, South Hadley, Massachusetts.

Other sources: Owens Papers; Wellesley College Archives; Yale University Archives; Grinstein, "Some 'Forgotten' Women of Mathematics"; Grace Goodyear Kirkman, *Genealogy of the Goodyear Family* (San Francisco, CA: Cubery, 1899); US Census 1870, 1880, 1930 CT.

Last modified: July 20, 2009.

SPEER, Mary (Taylor). March 27, 1906–November 23, 1966.
University of Pittsburgh (BA 1926, MA 1928, PhD 1935).

Mary Margaret Taylor was the only daughter and third of four children of Hallie Blanche Virginia (Criss) (1875–1959) and Albert Aaron Taylor (1872–1937), both of Washington County in the southwestern part of Pennsylvania, a few miles from Pittsburgh. Her parents were married in 1899. Taylor's mother attended common school and several terms at the state normal school and was a teacher in a one-room school and a housewife; her father attended common school and was a carpenter, mason, cabinet maker, and general contractor, having engaged in home study in addition to common school. They had four children: Joseph Stewart (b. 1901), Albert Alfred (b. 1902), Mary Margaret, and Edward A. (b. 1913), all born in Midway, Pennsylvania.

Mary Taylor grew up in Midway and attended the three-year high school there, 1918–21. The following year she took the classical course in the Carnegie High School on the outskirts of Pittsburgh and graduated in 1922. She was awarded the four-year college scholarship, given annually on the basis of a competitive examination, from Washington County. In her undergraduate years, 1922–26, at the University of Pittsburgh she carried majors in both mathematics and Latin. She was elected to Sigma Kappa Phi, a national foreign language honorary fraternity, and to QUAX, a women's science honorary society at Pittsburgh, before graduating with highest honor, the only recipient of a BA so honored in 1926. A brother recalls that she was offered graduate assistantships in both mathematics and Latin.

Taylor held a graduate teaching assistantship at Pittsburgh from 1926 to 1930. In this period she earned her master's degree in 1928, studied in the summer of 1928 at the University of Chicago, and continued work toward the PhD at Pittsburgh. From 1930 to 1934 Taylor was instructor of mathematics at the University of Pittsburgh at Johnstown, and in the academic year 1934–35 she was back at the Pittsburgh campus as a graduate assistant to complete the work for her PhD.

In 1935 Taylor married Eugene R. Speer (1903–1978), a Pennsylvania native who also graduated from the University of Pittsburgh in 1926, did graduate work there in mathematics and physics 1926–28, and graduated from the University of Pittsburgh law school. They remained in Pittsburgh, where she taught at her alma mater, and he practiced law. In 1936–37 she is listed in the university catalogue as Speer and as a graduate assistant. From 1937–38 to 1942–43 she is listed as an instructor in mathematics.

The Speers had three children: Virginia Ellen (1941–1981), Eugene R., born in 1943, and Susan Margaret, born in 1947. All three children did their undergraduate work in mathematics. The elder daughter did a year of graduate work in mathematics in England as a Fulbright scholar and became a computer software manager. The two younger children earned PhD's in mathematics and computer science, respectively. Eugene Speer is in the department of mathematics at Rutgers University; Susan Speer Owicki was a faculty member in the department of electrical engineering at Stanford University, later earned an MA in counseling psychology, and is a licensed marriage and family therapist.

In 1986 Mary Speer's son reported that she continued her position at the university until sometime after the birth of their elder daughter and before his birth, and

that his mother "recounted that she left the University of Pittsburgh, and mathematics teaching, because men junior to her were promoted to Associate Professor while she was not, and because she was told that this was because the men had families to support and needed the money" (Smithsonian questionnaire).

Mary Speer was an involved Presbyterian throughout her life and was an active member and administrator in Girl Scouts of Allegheny County, Pennsylvania, from the early 1950s until her death. She died of cancer at age sixty in Pittsburgh in 1966.

Thesis and dissertation:

1928 [Taylor, M. M.] A note on the solution in series of the general homogeneous linear differential equation. MA thesis, University of Pittsburgh.

1935 [Taylor, M. M.] Reciprocals of certain curves and surfaces with respect to a space cubic curve. PhD dissertation, University of Pittsburgh, directed by Forest Almos Foraker. Abstract: *Abstracts of theses, researches in progress, and bibliography of publications* 11:211–16. (*Univ. of Pittsburgh Bull.* 32, no. 1.)

Publication:

1929 [Taylor, M. M.] (Translator from the Latin) On the theory of combinations, by Jacques Bernoulli. In *A Source Book in Mathematics*, ed. D. E. Smith, 272–77. New York: McGraw-Hill Book Co. Reprint: 1959. New York: Dover Publications.

Abstracts:

1937 Reciprocals with respect to a space cubic. *Amer. Math. Monthly* 44:187 #1. Presented to the MAA, Beaver Falls, PA, 26 Oct 1935.

1939 Types of curvature of curves and surfaces. *Amer. Math. Monthly* 46:536 #4. Presented to the MAA, Greenville, PA, 13 May 1939.

Other sources: Owens questionnaire 1937; Smithsonian questionnaire prepared by son 1986; communications with University of Pittsburgh Alumni Association and University of Pittsburgh Archives; US Census 1910, 1920 PA.

Last modified: December 13, 2008.

SPENCER, Vivian E. October 27, 1907–September 14, 1980.
Oberlin College (BA 1928, MA 1929), University of Pennsylvania (PhD 1936).

Vivian Eberle Spencer was born in New Castle, Pennsylvania, the elder of two daughters of Ina M. (Eberle) (b. 1879) and Andrew Berger Spencer (b. 1869), both of whom were born in Pennsylvania. At the time of the 1910 census her parents had been married four years, and her maternal grandparents lived with them in New Castle; ten years later they still lived in New Castle, and her maternal grandmother had died. Her father was a traveling salesman throughout his life and was able to be with the family infrequently; he sold furniture in 1910 and stock in 1920. Her sister, Domina Eberle, was born in September 1920 and also earned a PhD in mathematics. Domina Spencer received her doctorate from MIT in 1942 under the direction of Dirk J. Struik and has spent the major part of her career on the faculty at the University of Connecticut in Storrs. She is one of the thirty-six women interviewed by Margaret A. M. Murray for her book *Women Becoming Mathematicians: Creating a Professional Identity in Post-World War II America.*

Vivian Spencer was taught at home, mainly by her mother, before enrolling in Oberlin College in 1924. At that time the family moved to Oberlin, Ohio, where they remained for most of the next decade. At Oberlin Vivian Spencer majored in mathematics and English and received a bachelor's degree in 1928. She remained at Oberlin and received a master's degree in mathematics the following year. From 1929 until 1933 she was a graduate assistant in mathematics at the University of Pittsburgh during the academic year and studied at the University of Chicago during several of the summers. In fall 1933 Vivian Spencer entered the graduate school at the University of Pennsylvania. Her family joined her in Philadelphia, where her thirteen-year-old sister, Domina, had her first formal schooling and continued to receive mathematical instruction from Vivian. During 1933–34 Vivian Spencer was a Bennett fellow at the University of Pennsylvania and took courses from F. W. Beal, Arnold Dresden (of Swarthmore College), J. R. Kline, J. A. Shohat, and Anna Pell Wheeler (of Bryn Mawr College). The following year she held a Moore fellowship, took courses from Shohat and Hans Rademacher, and was admitted to candidacy for the PhD in February 1935. During the fall of 1935 she was a research assistant, in May 1936 she passed her PhD examination, and in June 1936 she received her PhD.

Although Spencer no longer had a position at the University of Pennsylvania after the first semester 1935, she remained in Philadelphia and in January 1936 became a statistical research assistant for the National Research Project (NRP) of the Works Progress Administration (WPA); she also worked as an associate statistician for the US Bureau of Mines. She did research on fuel efficiency and labor production, and, in addition to authoring NRP reports, she contributed to the NRP volumes *Production, Employment, and Productivity in 59 Manufacturing Industries* and *Technology, Employment, and Productivity in Petroleum and Natural Gas Production.* During 1936–37, while employed by the WPA, she audited a graduate course in advanced economic statistics at the University of Pennsylvania.

In January 1940 Spencer moved to Washington, D.C., where she became a mineral economist and statistician for the US Department of Commerce. She worked for the US Bureau of the Census within the Department of Commerce, first as senior professional assistant for the mines and quarries division of the census bureau. She

then held various positions such as statistician, senior statistician, senior economic analyst, and assistant to the chief of the minerals section before becoming chief of the minerals section in July 1948. From 1950 to 1952 she directed the statistical staff for the President's Materials Policy Commission and in 1964 became special assistant for raw materials and production indexes.

In 1969 Spencer moved from the Bureau of the Census to the US Department of the Interior's Bureau of Mines to become chief of the commodity staff. She remained in this position until her retirement in 1971. From 1957 to 1965 Spencer was a professorial lecturer in statistics at American University and from 1973 was an adjunct professor in the mathematics department of the University of Connecticut, where her sister taught. Through the 1970s she continued to be listed as a statistician at the Bureau of Mines in the *Combined Membership List* of the AMS, MAA, and SIAM. She also served as a consultant to the census bureau in 1972 and 1977–78.

In the mid-1930s Vivian Spencer reported to the University of Pennsylvania placement office that she played violin and piano and that she read English, Latin, German, French, and Italian. In 1933 she listed her religious preference as Presbyterian.

After her retirement from the government Spencer maintained her home in Washington, D.C. She also had a home in Boston, where her sister lived. She was seventy-two years old when she died suddenly in 1980 in her Boston home from sepsis. Services were held at St. Paul's Church (Episcopal) in Brookline. She was survived by her sister, Domina Ebele Spencer, and was buried in New Castle, Pennsylvania.

Organizational affiliations: AMS, MAA, ASA.

Thesis and dissertation:

1929 Configurations of curves and surfaces. MA thesis, Oberlin College. Typescript.

1936 Persymmetric determinant and Jacobi matrix expressions for orthogonal Tchebycheff polynomials. PhD dissertation, University of Pennsylvania, directed by James Alexander Shohat. Printed version, 1939, reprinted from *Duke Math. J.* 5:333–56.

Publications:

1937 Asymptotic expressions for the zeros of generalized Laguerre polynomials and Weber functions. *Duke Math. J.* 3:667–75. Reviews: *JFM* 63.0332.02 (W. Hahn); *Zbl* 018.06002 (S. C. van Veen). Presented as "Note on asymptotic expression for the zeros of Hermite and Laguerre polynomials" to the AMS, New York City, 26 Oct 1935; abstract: *Bull. Amer. Math. Soc.* 41:786 #373.

1939 Persymmetric and Jacobi determinant expressions for orthogonal polynomials. *Duke Math. J.* 5:333–56. Published version of PhD dissertation. Reviews: *JFM* 65.0250.02 (W. Hahn); *Zbl* 021.30901 (N. Obrechkoff). Presented as "A classification of certain sequences of polynomials associated with persymmetric determinants" to the AMS, Ann Arbor, MI, 13 Sep 1935; abstract: *Bull. Amer. Math. Soc.* 41:623 #305.

Selected technical reports:

1938 with O. E. Kiesseling, G. A. Saeger, and N. Yaworski. *Fuel Efficiency in Cement Manufacturing 1909–1935.* National Research Project Report no. E-5. Philadelphia: WPA and US Department of the Interior, Bureau of Mines.

1940 *Production, Employment, and Productivity in the Mineral Extractive Industries, 1880–1938.* National Research Project Report no. S-2. Philadelphia: WPA.

1954 with C. A. R. Wardwell. *Raw Materials in the United States Economy: 1900–1952.* US Bureau of the Census Working Paper no. 1. Washington: US Department of Commerce, Bureau of the Census.

1964 *Raw Materials in the United States Economy: 1900–1961*. US Bureau of the Census Working Paper no. 6. Washington: US Department of Commerce, Bureau of the Census.
1970 *Raw Materials in the United States Economy: 1900–1966*. US Bureau of the Census Working Paper no. 30. Washington: US Department of Commerce, Bureau of the Census.
1972 *Raw Materials in the United States Economy: 1900–1969*. US Bureau of the Census Working Paper no. 35. Washington: US Department of Commerce, Bureau of the Census.
1980 *Raw Materials in the United States Economy: 1900–1977*. US Bureau of the Census Technical Paper no. 47. Washington: US Department of Commerce, Bureau of the Census.

Abstracts not listed above:

1939a Extensions of theorems of Markoff and Krein. *Bull. Amer. Math. Soc.* 45:90 #97. Presented to the AMS, New York City, 25 Feb 1939.
1939b with J. A. Shohat. Mechanical quadratures coefficients as functions of the moments. *Bull. Amer. Math. Soc.* 45:377 #240. Presented by V. E. Spencer to the AMS, Durham, NC, 8 Apr 1939.

Abstracts not listed above:
1939a Extensions of theorems of Markoff and Krein. *Bull. Amer. Math. Soc.* 45:90 #97. Presented to the AMS, New York City, 25 Feb 1939.
1939b with J. A. Shohat. Mechanical quadratures coefficients as functions of the moments. *Bull. Amer. Math. Soc.* 45:377 #240. Presented by V. E. Spencer to the AMS, Durham, NC, 8 Apr 1939.

Presentation not listed above:
The holor representation of raw material measures. Presented to the MAA, Washington, DC, 27 Apr 1974.

References to: AmMSc 8, 9S–11; AmMWSc 14; WhoAmW 1–4; WhoGov 1.
"Dr. Vivian Spencer, Retired Mineral Economist with U.S." *Washington Post*, 17 Sep 1980.
"Vivian E. Spencer, 72: Was Mineral Economics Teacher." *Boston Globe*, 17 Sep 1980.

Other sources: Owens questionnaire 1940; University of Pennsylvania Archives; communication with Oberlin College Alumni Records Office; Murray, *Women Becoming Mathematicians*; US census 1900, 1910, 1920, 1930 PA, 1930 OH.

Last modified: December 15, 2008.

SPERRY, Pauline. March 5, 1885–September 24, 1967.
Smith College (BA 1906, MA 1908), University of Chicago (MS 1914, PhD 1916).

Pauline Sperry was born in Peabody, Massachusetts, the second of three children of Henrietta (Learoyd) (b. 1850) and Willard Gardner Sperry (b. 1847), both natives of Massachusetts. Her mother studied at Abbot Academy in Andover, Massachusetts, and between 1868 and 1878 served five years as a teacher and vice principal there. Her father graduated from Yale University in 1869. Her parents married in 1879. Willard Gardner Sperry was master of a high school in Massachusetts, served for many years as pastor at Congregational churches in Massachusetts and New Hampshire, received a doctor of divinity degree in 1893, was president of Olivet College in Michigan 1893–1904, and then became a minister in York Beach, Maine. Pauline Sperry's siblings were Willard Learoyd (1882–1954) and Henrietta (1889–1974). In 1885 the Sperrys bought a cottage in York County, Maine, which they owned for nearly fifty years, and to which they returned every summer. Her brother earned his bachelor's degree from Olivet College, was in the first group of American Rhodes scholars to go to Oxford in 1904, earned master's degrees from Oxford and from Yale, became a clergyman and writer, and spent most of the latter years of his life as dean of the Harvard Divinity School. Her sister graduated from Smith College and became a writer. She wrote a weekly food column for the *New York Times* in the 1930s, wrote four books, and was a contributor to women's magazines.

In 1902 Pauline Sperry began her undergraduate work at Olivet College in Michigan, where her father was president until 1904. She then attended Smith College in Northampton, Massachusetts, received her BA from Smith in 1906, and spent most of the first few years of her career there. The year after her graduation, she was a teacher of mathematics at Hamilton Institute in New York City. The next year, 1907–08, she was a fellow in music and mathematics at Smith, where she earned a master's degree in music in 1908. Sperry remained at Smith as an assistant in mathematics 1908–11 and as instructor 1911–12. In 1910 she, her widowed mother, and her sister, who graduated from Smith that year, were living in Northampton. In 1912–13 Pauline Sperry was a traveling fellow from Smith.

Sperry then studied at the University of Chicago and received her master's degree in mathematics in 1914. She was a fellow at Chicago 1915–16 and received her doctorate in 1916 with a dissertation in projective differential geometry supervised by Ernest J. Wilczynski. Sperry returned to Smith as assistant professor for the year 1916–17. During the 1917 summer session she taught at the University of California in Berkeley, at that time the only campus of the University of California, and joined the faculty there as an instructor that autumn.

Sperry remained at the University of California for the rest of her career. She was instructor 1917–23, assistant professor 1923–31, associate professor 1931–52, and associate professor emeritus from 1952. When appointed assistant professor, she was the first woman in mathematics in a professorial rank at the University of California. Sperry taught graduate courses in differential geometry and supervised the doctoral dissertations of five students at Berkeley: William Lawrence Hutchings (1935), Philip Osborne Bell (1936), Raymundo Acosta Favila (1939), David Bliss Dekker (1948), and Ting-Kwan Pan (1949). She was on leave the first half of 1938–39 and was in Europe some of that time. During her sabbatical in the spring

of 1949, Sperry was in Carmel, California, where she had spent many summers during at least the previous two decades. In addition to her regular undergraduate and graduate teaching, in August 1943 she taught navigation to the University of California Navy ROTC.

In April 1920 the upper class and graduate women mathematics students at the University of California formed a mathematics club, Mu Theta Epsilon, that had as one of its aims improved cooperation among students and faculty. All of the faculty were honorary members but the students chose Pauline Sperry as their one active faculty member. Although the latest mention of this club, described in 1925 as a women's mathematics honor society, to appear in the *American Mathematical Monthly* was in January 1928, Sperry's mentoring of other women did not end then, and, at least in the 1940s, she would take women graduate students to lunch in the Women's Faculty Club. She was also involved in the MAA, and served as vice chairman 1944–45 and then chairman 1945–46 of the Northern California Section.

Although Sperry is listed as being an associate professor 1931–52, she did not serve as such 1950–52. Sperry was among the thirty-one professors dismissed from the university in July 1950 because they would not sign a loyalty oath affirming "that I am not a member of the Communist Party or any other organization which advocates the overthrow of the Government by force or violence" (Gardner, *California Oath Controversy*, 155). It was later reported that Sperry's "concern, and thus her refusal to sign, centered on the damage to the free and open atmosphere of the university that followed the requirement of the oath" (Innis, "Lessons from the Controversy over the Loyalty Oath," 355). In October 1952 the California Supreme Court ordered that the non-signers be reappointed and Sperry was given the rank associate professor emeritus as of July 1952; further litigation brought her back pay for 1950–52 in 1956.

Sperry was always proud of the stand she took in 1950 and explained in her 1965 article, "Formula for happiness at eighty," in the *Smith Alumnae Quarterly* that she "had always burned for causes" (p. 154). She reiterated her commitment to civil liberties and noted that part of her formula "is summed up in this phrase: 'Frugal spending and extravagant giving'" (p. 155); she also described many of the good deeds that represent her adherence to this part of the formula.

During her years at the University of California and possibly for some years before, Sperry had a close friend in Alice Tabor (1878–1959), who had gone to the University of California in 1916, a year before Sperry joined the faculty. Tabor had also been a graduate student at the University of Chicago and earned a master's degree from there in 1913 and a PhD in 1916, before joining the German department at California. For many years, starting at least by 1920, Sperry lived with Alice Tabor and Tabor's mother in Berkeley; Tabor's mother died in 1948, the year that Alice Tabor retired from the university, and Sperry and Tabor continued to share a residence in Berkeley. At some point, by the early 1930s, they had built a home in Carmel, California, on the Monterey Peninsula, in which they spent many summers, and to which they moved permanently in 1950. The 1960 obituary of Alice Tabor by Sperry and others noted that at the University of California Tabor had "conceived the idea of the Friday Dinner Club, a group of faculty women who gathered monthly for many years to share their widespread and varied interests in research" (**1960**, 50). The official Faculty Women's Club was organized in 1919 with Sperry and Tabor responsible for the finances and with Tabor as treasurer

of the building committee. The clubhouse opened in 1923, and Sperry served as director of the club 1926–28.

After she retired to Carmel, Sperry was active in the Monterey Peninsula Friends' Meeting, the American Civil Liberties Union (ACLU), the American Friends Committee on Legislation, the Committee for a Sane Nuclear Policy (SANE), and the League of Women Voters. Sperry's own religious beliefs and political commitments may have been reinforced by her friendship with Tabor, who had a "deep concern for human welfare [that] was a natural inheritance from a long line of Quaker ancestors who as abolitionists had sheltered slaves escaping to Canada, helped revolutionize the treatment of the mentally ill, and pioneered in prison reform and in the Woman Suffrage Movement" (**1960**, 50). Sperry reported to Smith College in 1957 that she had been active in the local Democratic headquarters in the recent election. She was in London in the summer of 1959.

In early 1961 Sperry reported that she had sold her home in Carmel and moved to Forest Hill Manor, a retirement community in Pacific Grove, California. That same year she received the Olivet College distinguished alumni award. She reported to Smith in February 1963 that she had broken her arm; a year later she noted that she had made a three-month trip to England and New York by freighter. In April 1964 Sperry reported as her chief interest the Step-by-Step School for impoverished children in Haiti. In 1967 Pauline Sperry died in Pacific Grove at the age of eighty-two.

Organizational affiliations: AMS, MAA, AAUP, Phi Beta Kappa, Sigma Xi.

Theses and dissertation:

1908 The development of modern English oratorio. MA thesis, Smith College. Typescript.

1914 On the theory of a one-to-one and one-to-two correspondence with geometrical illustrations. MS thesis, University of Chicago. Typescript.

1916 Properties of a certain projectively defined two-parameter family of curves on a general surface. PhD dissertation, University of Chicago, directed by Ernest Julius Wilczynski. Private edition, 1918, distributed by the University of Chicago Libraries, reprinted from *Amer. J. Math.* 40:213–24.

Publications:

1918 Properties of a certain projectively defined two-parameter family of curves on a general surface. *Amer. J. Math.* 40:213–24. Published version of PhD dissertation. Reviews: *JFM* 46.1101.02 (R. von Lilienthal); *Rev. semestr. publ. math.* 27, pt. 1: 2 (E. B. Cowley). Presented to the AMS, Chicago, 22 Apr 1916; abstract: *Bull. Amer. Math. Soc.* 22:441–42 #29.

1926 with H. E. Buchanan. *Plane Trigonometry.* Johnson's Mathematics Series. Richmond, VA: Johnson Publishing Co. Reviews: *Amer. Math. Monthly* 35:144–45 (P. A. Fraleigh); *Sch. Sci. Math.* 27:776 (J. M. Kinney).

1928 *Short Course in Spherical Trigonometry.* Johnson's Mathematics Series. Richmond, VA: Johnson Publishing Co. Review: *Amer. Math. Monthly* 36:394–95 (M. E. Wells).

1931 Bibliography of projective differential geometry. *Univ. Calif. Publ. Math.* 2:119–27. Reviews: *Bull. Amer. Math. Soc.* 38 (1, pt. 1): 19 (E. P. Lane); *JFM* 57.1545.06 (G. Feigl).

1960 with C. H. Bell, J. Miles, and L. M Price. Alice Post Tabor, German: Berkeley. *University of California: In Memoriam* (April): 49–51.

1965 Formula for happiness at eighty. *Smith Alumnae Quarterly* (Spring): 154–55.

Abstracts not listed above:

1919 On the work of Gabriel Marcus Green in the field of projective differential geometry. *Bull. Amer. Math. Soc.* 25:394 #4. Presented to the AMS, Palo Alto, CA, 5 Apr 1919.

1923 On real elements in imaginary linear spaces. *Bull. Amer. Math. Soc.* 29:196 #16. Presented to the AMS, Palo Alto, CA, 7 Apr 1923.
1933 Ernest Julius Wilczynski. *Bull. Amer. Math. Soc.* 39:203 #96. Invited address presented to the AMS, Palo Alto, CA, 18 Mar 1933.
1941 The gyroscope and its uses in aviation and navigation. *Amer. Math. Monthly* 48:292 #3. Invited address presented to the MAA, San Francisco, CA, 25 Jan 1941.

References to: AmMSc 3–8, 9P–10P; AmWom 1935–40; BiDWSci; BioWMath; MacTutor; NotWoMa, Poggendorff 6, 7b.
"Pauline Sperry." (Obituary) *Smith Alumnae Quarterly*, (Feb 1968): 63.
Lehmer, D. H., Hans Lewy, and R. M. Robinson. "Pauline Sperry, Mathematics: Berkeley." *University of California: In Memoriam* (May 1968): 116–18.
Fasanelli, Florence D. "Pauline Sperry (1885–1967)." In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 217–19. Westport, CT: Greenwood Press, 1987.

Related manuscript material:
William Learoyd Sperry. Letters and Sermons, 1902–1954. Andover-Harvard Theological Library, Harvard Divinity School. Includes letters to his sister Pauline Sperry.
Group for Academic Freedom records, 1950-1956. Bancroft Library, University Archives. Berkeley, California.

Other sources: Owens questionnaires 1937, 1940; Smith College Archives; University of California, Berkeley, Archives; communication with Monterey (CA) Public Library; George R. Stewart, *The Year of the Oath* (Garden City, NY: Doubleday and Co., 1950); David P. Gardner, *The California Oath Controversy* (Berkeley: University of California Press, 1967); Nancy K. Innis, "Lessons from the Controversy over the Loyalty Oath at the University of California," *Minerva* 30 (1992): 337–65; Moore, *Mathematics at Berkeley*, extract in *AWM Newsletter* 36 (Jul–Aug 2006): 16–25, as "Women Mathematicians at Berkeley–The Early Years"; WhAm 4 (Sperry, Willard Gardner); "Deaths: Prof. Tabor," *Monterey Peninsula Herald*, 6 Mar, 1959; US Census 1880 MA, 1900 MI, 1910 MA, 1920, 1930 CA; SSDI.

Last modified: December 17, 2010.

STARK, Marion E. August 23, 1894–April 15, 1982.
Brown University (Women's College) (BA 1916), Brown University (MA 1917), University of Chicago (PhD 1926).

Marion Elizabeth Stark, born in Norwich, Connecticut, was the daughter of Ella E., born in 1859 in Massachusetts, and Charles L. Stark (1850–1926) of Connecticut. It was reported in the 1900 census that she, her parents, and her paternal grandmother were living in Norwich. At that time, her parents had been married sixteen years, and another child had died. In 1900 and 1910 her father was a salesman, and in 1920 a buyer, for a dry goods store.

Stark received her elementary education at the Pearl Street School and the Mt. Pleasant Street School, both in Norwich; her secondary education was at the Norwich Free Academy.

After graduating from Brown (Women's College) in 1916, Stark remained the next year as a Lyra Brown Nickerson fellow and received her master's degree in 1917. From 1917 until 1919 Stark was the professor of mathematics, and sole mathematics instructor, at Meredith College, a women's college in Raleigh, North Carolina. When she left, her professorship at Meredith was taken for one year by Ida Barney.

Stark then became an instructor at Wellesley College where she was to remain, except for further graduate work, for the rest of her career. During her first year there, 1919–20, she took courses from Helen A. Merrill and Mabel M. Young while teaching part time. As early as 1921 she was interested in geometrical constructions, giving the first of many talks to mathematics clubs on that topic. She studied at the University of Chicago during the summer quarter of 1923 and autumn 1924 through summer 1925. She held a fellowship during 1924–25 and received her doctorate in 1926 with a dissertation in the calculus of variations.

In 1927, a year after receiving her PhD, Stark was promoted to assistant professor at Wellesley. She was promoted to associate professor in 1936 and professor in 1945. She retired as a Lewis Atterbury Stimson professor emeritus of mathematics in 1960.

In 1932 Stark attended the International Congress of Mathematicians in Zurich. She continued to study mathematics: at the University of Chicago during the fall quarter of 1938 and at Harvard 1939–40. Between 1940 and 1950 she published ten book reviews in the *National Mathematics Magazine* (renamed *Mathematics Magazine* in 1947). During this period, and continuing through 1960, Stark was on the editorial staff of this journal; starting in 1944 she served as the editor of the "Brief Notes and Comments," and when the journal changed its name she became editor of the "Mathematical Miscellany" section for an additional three years. Throughout her career she was involved with mathematics clubs. She wrote a mathematical play, "Modern Mathematics Looks Up Its Ancestors," which was performed by the Wellesley mathematics club in 1931 and again just before its publication in 1936. It was also performed after its publication by, at least, Kappa Mu Epsilon at Mount St. Scholastica College. Stark participated in mathematics institutes for high school and college teachers from 1955 to 1958 at Middlebury College, Williams College, Dartmouth College, and Brandeis University, respectively; during 1957 she was a discussion leader for descriptive geometry. She continued to write reviews in the 1950s and early 1960s, first for *Scripta Mathematica* and then for the *American Mathematical Monthly*. She served on the council of the Association of Teachers of Mathematics in New England.

In at least the early 1930s, Marion Stark's widowed mother lived with her in Wellesley. Later Stark shared her home with Grace Ethel Arthur, the secretary to presidents of Wellesley for nearly four decades, who retired in 1952. During World War II, Stark temporarily adopted several children from Europe and a child from Korea, at least some through the Foster Parents Plan and the Christian Children's Fund.

Stark was an enthusiastic traveler whose summer trips included, among many others, Europe in 1921, Nova Scotia in 1955, and Glacier National Park in 1956. In the late 1930s she described herself as a Baptist and a Republican and indicated that her hobbies were poetry and horticulture and that her favorite recreation was tennis.

After her retirement in 1960, Stark lived in Rockport, Massachusetts, where she was a member of the Congregational church. In 1974 she moved to New Jersey. In addition to being an avid gardener, she wrote poetry, collected nautical art, and in her later years taped recordings of mathematical books for blind students.

Stark suffered a stroke in about 1971. She died at age eighty-seven at her home in Waterford, New Jersey, in 1982. It was noted in the *Boston Globe* obituary that she had no survivors except for the children she befriended. Funeral services and burial were in Norwich, Connecticut.

Organizational affiliations: AMS, MAA, Canadian Math. Congress (now Canadian Math. Soc.), Circolo Mat. di Palermo, AAAS, Phi Beta Kappa, Sigma Xi.

Dissertation:

1926 A self-adjoint boundary value problem associated with a problem of the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series* 5:55-62.

Publications:

1920 Mathematical nightmare. *Sepiad* (Brown University) 20 (May): 32–33. First two of five stanzas reprinted *Amer. Math. Monthly* 27 (1920): 424.

1936 Modern mathematics looks up its ancestors. *Amer. Math. Monthly* 43:299–304.

1940 Review of *Fabre and Mathematics and Other Essays*, by L. G. Simons. *Natl. Math. Mag.* 14:496.

1941 Constructions with limited means. *Amer. Math. Monthly* 48:475–79.

1942a Methods of mathematical proof for undergraduates. *Natl. Math. Mag.* 16:350–51.

1942b Review of *Basic College Mathematics*, by C. W. Munshower and J. F. Wardell. *Natl. Math. Mag.* 17:48.

1942c Review of *Plane and Spherical Trigonometry*, by F. A. Rickey and J. P. Cole. *Natl. Math. Mag.* 17:139.

1942d Review of *To Discover Mathematics*, by G. M. Merriman. *Natl. Math. Mag.* 16:319–20.

1942e with H. A. Merrill. A mathematical contest. *Amer. Math. Monthly* 49:191–92.

1943 "We Look Before and After." *Natl. Math. Mag.* 18:116–19.

1944 Review of *Elementary Aviation*, by L. E. Moore. *Natl. Math. Mag.* 19:51–52.

1948a Review of *Analytic Geometry*, by D. S. Nathan and O. Helmer. *Math. Mag.* 21:268.

1948b Review of *Analytic Geometry and Calculus*, by J. F. Randolph and M. Kac. *Math. Mag.* 21:269–70.

1948c Review of *Six-Place Tables*, 7th ed. with explanatory notes by E. S. Allen. *Math. Mag.* 22:80–81.

1948d (Translator from the German) Geometrical constructions with a ruler, given a fixed circle with its center, by J. Steiner. *Scripta Math.* 14:187–264. Edited with an introduction and notes by R. C. Archibald. Review: *Scripta Math.* 16:99–100 (F. W. Kokomoorj). Reprint: 1950. Scripta mathematica studies no. 4. New York: Yeshiva University.
1949a Review of *College Algebra*, by M. Richardson. *Math. Mag.* 22:161.
1949b with H. Russell and M. Young. Helen A. Merrill, '86. *Wellesley Alum. Mag.* 33:353–54.
1950 Review of *First Year College Mathematics with Applications*, by P. H. Daus and W. M. Whyburn. *Math. Mag.* 23:268–69.
1953 Review of *Theorie der geometrischen Konstruktionen*, by L. Bierberbach. *Scripta Math.* 19:169–71.
1954 Review of *Symmetry*, by H. Weyl. *Scripta Math.* 20:78–79.
1955 Review of *Analytische Geometrie* 2nd ed., and *Projektive Geometrie* 3rd enl. ed., by W. Blaschke. *Scripta Math.* 21:286–87.
1959 Review of *College Algebra* 4th ed., by J. B. Rosenbach, E. A. Whitman, B. E. Meserve, and P. W. Whitman. *Amer. Math. Monthly* 66:605–6.
1961a Review of *Introductory Algebra*, by M. D. Eulenberg and T. S. Sunko. *Amer. Math. Monthly* 68:680–81.
1961b Review of *A Survey of Basic Mathematics*, by H. G. Apostle. *Amer. Math. Monthly* 68:76.

Abstract:
1926 A self-adjoint boundary value problem associated with a problem of the calculus of variations. *Bull. Amer. Math. Soc.* 32:129–30 #40. Presented to the AMS, New York City, 2 Jan 1926. Based on PhD dissertation.

Presentation not listed above:
Some problems of a young instructor [by one who has been]. Presented to the MAA, Wellesley, MA, 12 Aug 1944.

References to: AmMSc 5–8, 9P–11P; AmWom 1935–40.
"Marion E. Stark, 87: Taught at Wellesley College." *Boston Globe*, 29 Apr 1982.
Clement, Mary Dean. "In Memoriam: Marion Elizabeth Stark, 1894–1982." *Wellesley* 66 (Summer 1982): 41, 47.

Other sources: PhD dissertation vita 1926; Owens questionnaires 1937, 1940; Brown University Archives; Meredith College Archives; Wellesley College Archives; US Census 1900, 1910, 1920 CT, 1930 MA; SSDI.

Last modified: March 26, 2008.

STOKES, Ellen Clayton. September 27, 1900–May 23, 1974.
Brown University (Women's College) (BA 1923), Brown University (MA 1924), University of Chicago (PhD 1939).

Ellen Clayton Stokes, born in Hackensack, New Jersey, was the middle child of Louisa Cartwright (Stoney) (b. 1873) and John Edgar Stokes (b. 1872), both natives of New York State. Her older brother, John Wesley, was born in 1898. When the 1900 census was enumerated, her parents, who had been married five years, and her brother were living with her maternal grandparents in Hackensack, New Jersey. Louisa Stokes died in childbirth six years later when the youngest child, David, was born. John Edgar Stokes was a successful manufacturing representative with New England Yarn Company until after World War I. He was later involved in retail selling and owned an appliance store.

Ellen Stokes received most of her elementary and all of her secondary education at boarding schools in Beaver Dam, Wisconsin, where she first attended Hillcrest School and then Wayland Academy. Her father remarried in 1917, and he and his second wife, Wilhelmina (Birkhoff) Stokes (1880–1975), had one daughter, Joan, eighteen years younger than Ellen.

The Stokes family was living in Providence, Rhode Island, when Ellen Stokes entered Women's College in Brown University in 1919. While there she studied with R. G. D. Richardson and R. C. Archibald, among others. She earned her bachelor's degree in 1923 and her master's degree the following year.

In 1924 Stokes accepted a position as instructor in mathematics at Coker College for Women (now Coker College) in Hartsville, South Carolina. While she was at Coker, Stokes was considering further studies in mathematics. In a note to Richardson in January 1925 she indicated that she had talked with Archibald about work for the next year and he advised staying at Coker for another year for the sake of her reputation.

After two years at Coker College, Stokes moved to the New York State College for Teachers in Albany (now the University at Albany, State University of New York), in part to be near family members who were living in the area. She spent the rest of her career there. In the summer of 1928, Stokes took three mathematics courses at Cornell University. Then, beginning in the summer of 1933, she studied for a total of nine quarters at the University of Chicago before receiving her doctorate there in December 1939 with a dissertation in the calculus of variations.

During the period of her studies at Chicago, Stokes remained an instructor in mathematics at the New York College for Teachers in Albany. In 1943 she became dean of women and stayed in that position until her retirement in 1965. A mathematics colleague at Albany was Caroline A. Lester, who joined the faculty in 1929 and lived in the same apartment building as Stokes in some of their earlier years in Albany. In about the early 1950s, Stokes and two other women on the faculty, one in psychology and one in biology, bought a house in Albany, painted it pink, and shared the house for many years.

Ellen Stokes was described by her half-sister as about five feet six inches tall, of medium build, not beautiful, but very attractive. She was quiet and "never had an unpleasant word to say." She had a whimsical sense of humor and was fun to be with. She didn't do community work but was close to her family and adored children. Stokes was described as a perfectionist whose main hobby was handwork,

especially weaving and knitting, at which she excelled. She also played bridge and made two or three trips abroad with friends.

Ellen Stokes died in Albany in 1974 at age seventy-three after suffering an aneurysm. She was survived by her step-mother, who had been living with her in Albany, her half-sister in Schenectady, two nieces, and a nephew. Funeral services were held at St. Stephen's Episcopal Church in Schenectady.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Dissertation:
1939 Applications of the covariant derivative of Cartan in the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Private edition, 1942, distributed by the University of Chicago Libraries, reprinted from *Contributions to the Calculus of Variations, 1938–1941*, 139–74.

Publication:
1942 Applications of the covariant derivative of Cartan in the calculus of variations. In *Contributions to the Calculus of Variations, 1938–1941*, 139–74. Chicago: Univ. of Chicago Press. Published version of PhD dissertation. Review: *MR* (S. B. Myers) 4,46g.

Reference to:
"Stokes." (Death notice) *Albany Times-Union*, 24 May 1974.

Other sources: PhD dissertation vita 1942; application for social security account number 1942; telephone conversation with Joan E. Stokes (half-sister), 11 Aug 1998; Brown University Archives (R. G. D. Richardson Papers); US Census 1900 NJ, 1920 RI, 1930 NY.

Last modified: July 20, 2009.

STOKES, Ruth W. October 12, 1890–August 27, 1968.
Winthrop Normal and Industrial College of South Carolina (BA 1911), Vanderbilt University (MA 1923), Duke University (PhD 1931).

Ruth Wyckliffe Stokes was born in Greenville, South Carolina, the youngest of six children of Frances Emily (Fuller) (1857–1915) and William Henry Stokes (b. 1850), natives of South Carolina who married in 1879. In the 1880 census her father was listed as an MD and a farmer; in 1900 he was listed as a farmer. Her older siblings were John T. (1880–1963), Marie V. (1881–1957), Franklin F. (1883–1943), Sara F. (1885–1977), and Clarence E. (1887–1941). In 1910, five of the adult children were living at home with their widowed mother in Mountville, South Carolina. No occupation was given for the nineteen-year-old Ruth, her sister Marie was a public school teacher, two brothers were farmers, and one was at school. Although there is conflicting information about the birth year for Ruth Stokes, census records indicate that 1890 is the most likely date.

Stokes attended Winthrop Normal and Industrial College of South Carolina (after 1920, Winthrop College, the South Carolina College for Women; now Winthrop University), then a women's college in Rock Hill, South Carolina, for four years and graduated in 1911. She had six teaching positions during the next dozen years. In 1911–12 she taught in grade school in Denmark, South Carolina; the next year she taught high school mathematics, English, and French in the same town; in 1913–16 she was principal of the Ebenezer Graded School in Rock Hill, South Carolina; the following year she was head of the mathematics department at Synodical College in Fulton, Missouri; in 1917–20 she taught high school mathematics and English in Spartanburg, South Carolina; and in 1920–22 she taught high school mathematics in Greenville, South Carolina.

According to material in the Winthrop University Archives, Stokes indicated in January 1922 that she had received certificates in mathematics and English for work done at Columbia University (six weeks), the University of Virginia (six weeks), and the University of Chicago (six weeks). She also did correspondence work at the University of Chicago. Stokes held a fellowship at Vanderbilt 1922–23 and received her master's degree in 1923. She spent the next five years as assistant professor in a four-person mathematics department at Winthrop College. During the summers of 1926, 1927, and 1928 she attended summer school at the University of Wisconsin.

In the autumn of 1928 Stokes enrolled at Duke University, where she was a graduate student and an assistant 1928–31. She received her PhD, the first awarded in mathematics by Duke, in 1931. Apparently at the time of her departure for Duke for her doctoral work, Stokes felt that she had a private understanding with the president of Winthrop that she would return to her position there after receiving her degree. However, he died in 1928, and his replacement was not aware of such an understanding. Thus, after Stokes received her degree in 1931, she did not return to Winthrop but instead remained at Duke as an instructor 1931–32. In 1931 Stokes published her dissertation in the *Transactions* of the AMS. Her dissertation results were discussed in some detail in "Different motivations and goals in the historical development of the theory of systems of linear inequalities" by Tinne Hoff Kjeldsen (*Arch. Hist. Exact Sci.* 56 (2002): 469–538). He noted, "The innovative element in

Stokes' contribution to the literature she is building on is the *method* she invoked in developing the theory and the numerical solution method she derived" (p. 510).

The next three years, 1932–35, Stokes was an associate professor at North Texas State Teachers College (now North Texas State University) in Denton. The following year she was professor and head of the department at Mitchell College in Statesville, North Carolina. She also taught in the summer of 1936 at the Asheville Normal and Teachers College in North Carolina. In the fall of 1936 Stokes returned to Winthrop College, where she remained for most of the next ten years as professor of astronomy and mathematics and as department head. While there she was active in a number of professional organizations and, in 1940, was a member of the Solar Eclipse Expedition to St. Augustine, Florida. During the summer of 1941 Stokes attended the summer session at Brown University for advanced instruction and research in mechanics. At some point in the period 1942 through 1946, during and after World War II, she was an instructor of military cryptography and cryptanalysis.

In the 1940s Stokes had disputes with the administration at Winthrop, partly over issues of funding for the mathematics department. These resulted in her leaving in 1946, when she joined the faculty at Syracuse University as assistant professor. Nancy Cole became a colleague a year later. Stokes remained at Syracuse the rest of her career. She held a dual position in mathematics and education in 1947–48 and was promoted to associate professor in 1953. Stokes was granted a year's leave of absence in 1956–57 to accept a visiting professorship at the American University in Beirut. She returned home in December 1956 to be with her sister, Marie V. Stokes, who was at that time in the Greenville, South Carolina, hospital. Marie Stokes died the following August. Ruth Stokes retired from Syracuse as associate professor emeritus in June 1959 after which she was associate professor, 1959–60, at Longwood College (now Longwood University) in Farmville, Virginia.

Stokes was always professionally active. In the early 1940s she was vice-chairman and then chairman of the Southeastern Section of the MAA, and she was president of the mathematics section of the South Carolina Education Association. She was a member of the board of directors of NCTM 1944–47 and was a member of their committee on visual aids. Stokes was particularly interested in mathematical models; she gave a number of talks on this subject in the 1940s and exhibited a collection of models at the International Congress of Mathematicians at Cambridge, Massachusetts, in 1950. While she was at Syracuse she was the first editor-in-chief of the *Pi Mu Epsilon Journal*, whose first issue was November 1949 and whose parent organization was founded at Syracuse in 1914. She belonged to the New York Academy of Sciences, the South Carolina Academy of Science, and the Astronomical Society of the Pacific.

Stokes was also a member of Pi Lambda Theta, an honorary and professional association in education; Chi Delta Phi, an honorary literary society; and Sigma Kappa, a social sorority. Around 1940 she described herself as a Methodist and a Democrat with art (oil paintings, florals, landscapes) as a hobby and golf as her favorite recreation.

After her retirement, Stokes moved to her family home in Mountville, South Carolina. She died at age seventy-seven in the hospital in nearby Clinton in 1968 and was buried in the Mountville Cemetery. An obituary noted that she was a member of the Mountville Presbyterian church, the Daughters of the American

Revolution, and the National League of American Pen Women. She was survived by one sister, Sara S. Hunter of Laurens, South Carolina.

Organizational affiliations: AMS, MAA, NCTM, AAAS, Sigma Delta Epsilon, AAUW, AAUP, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1923 History of the fundamental theorem of algebra. Master's thesis, Vanderbilt University.
1931 A geometric theory of solution of linear inequalities. PhD dissertation, Duke University, directed by Joseph Miller Thomas. Typescript. Printed version, 1931, reprinted from *Trans. Amer. Math. Soc.* 33:782–805.

Publication:
1931 A geometric theory of solution of linear inequalities. *Trans. Amer. Math. Soc.* 33:782–805. Published version of PhD diss. Reviews: *JFM* 57.0249.02 (B. H. Neumann); *Zbl* 002.24802 (K. Hofreiter). Presented by title to meeting of the AMS, New York City, 3 Apr 1931; abstract: *Bull. Amer. Math. Soc.* 37:171 #140.

Abstracts not listed above:
1936a Quadratic factors of symbolic forms. *Amer. Math. Monthly* 43:459 #17. Presented to a meeting of the MAA, Columbia, SC, 17–18 Apr 1936.
1936b Symbolic cubic forms in six variables. *Amer. Math. Monthly* 43:8 #5. Presented to the MAA, Lubbock, TX, 20 Apr 1935.
1939 Materials and devices as aids to the teaching of mathematics. *Amer. Math. Monthly* 46:389 #26. Presented to a meeting of the MAA, Charleston, SC, 24–25 Mar 1939.
1940a Aids to motivation in junior college mathematics. *Amer. Math. Monthly* 47:517 #21. Presented to a meeting of the MAA, Athens, GA, 29–30 Mar 1940.
1940b Four models on conic sections for use in projective geometry. *Amer. Math. Monthly* 47:516 #2. Presented to a meeting of the MAA, Athens, GA, 29–30 Mar 1940.
1941 A demonstration of mathematical models and how they are constructed. *Amer. Math. Monthly* 48:424 #21. Presented to the MAA, Chapel Hill, NC, 28–29 Mar 1941.
1946 Mathematical program for college majors who plan to teach. *Amer. Math. Monthly* 53:488 #8. Presented to a meeting of the MAA, Raleigh, NC, 19–20 Apr 1946.
1949 Some models useful in the teaching of high school and college mathematics. *Amer. Math. Monthly* 56:144 #5. Presented to the MAA, Schenectady, NY, 1 May 1948.
1953 Conic sections and other curves on the screen and in space. *Amer. Math. Monthly* 60:597 #4. Presented to a meeting of the MAA, West Point, NY, 8–9 May 1953.

Presentation not listed above:
Equipping mathematics majors to teach in the high schools of the future. Presented to the NCTM, Cleveland, OH, 22 Feb 1946.

References to: AmMSc 5–8, 9P–10P; AmWom 1935–40; WhoAmW 1.
"Dr. Stokes, Mathematician, Dies at 76." Unidentified newspaper clipping.
"Ruth Wyckliffe Stokes (October 12, 1891 – August 1968)." (Historical Biography) *Southeastern Section Newsletter* (Spring 2008) 27: 19–23.

Other sources: Owens questionnaire 1937; Brown University Archives; communications with Duke University Archives and Winthrop University Archives; Tinne Hoff Kjeldsen, "Different motivations and goals in the historical development of the theory of systems of linear inequalities," (*Arch. Hist. Exact Sci.* 56 (2002): 469–538); US Census 1880, 1900, 1910, 1920 SC.

Last modified: March 22, 2011.

SULLIVAN, Mildred M. November 16, 1907–August 30, 1958.
Radcliffe College (BA 1929, MA 1930, PhD 1932).

Mildred Marie Sullivan was born in Boston, Massachusetts, the youngest of two surviving children of three born to Alice T. (Sullivan) (b. 1875) and John F. Sullivan (b. 1871), both born in Massachusetts of Irish parents. In 1900 her parents had been married six years, and there was one living child, John F. Jr. (b. 1895), of two that had been born. Her father was a letter carrier for the post office.

Sullivan did her undergraduate and graduate work at Radcliffe College and earned her doctorate at the age of twenty-four. Her dissertation in potential theory was supervised by O. D. Kellogg. In Kellogg's November 1931 application for funds for a book project, he wrote, "the assistant is available in Miss Mildred M. Sullivan, now a graduate student at Radcliffe and a candidate for the doctorate in June of the present year. She has unusual originality and power to carry through, with a minimum of guidance, on assigned programs. Her availability appears to present a rare opportunity for help on the above project" (Papers of William Fogg Osgood, HUG 4659.10, Harvard University Archives). Sullivan planned to work as Kellogg's research assistant the year after she received her doctorate in June. However, Kellogg died suddenly in July 1932. Sullivan was a research assistant in mathematics at Harvard under a Milton Fund grant in 1932–33. During that year she presented their joint work at an AMS meeting and wrote a paper based on that work that was published in 1935 under her name and Kellogg's in the *Memoirs of the American Academy of Arts and Sciences*.

The year following her postdoctoral year at Harvard, Sullivan was a National Research Fellow working at Rice Institute in Houston and at the University of California. She was an instructor at the University of Houston 1934–35, during its first year as a four-year institution. This was during the Great Depression, and there is no indication that Sullivan was able to secure academic employment at the end of that year. In January 1937 Sullivan became an editorial assistant for the AMS in order to succeed Alta Odoms (Gray), who had already resigned effective April 1, 1937. In 1938 Sullivan became an instructor at Queens College in Flushing, New York. She was an instructor until 1946, when she was promoted to assistant professor. The year after her promotion Sullivan joined the MAA and from then on regularly attended meetings of the Metropolitan New York Section. Also starting when she became editorial assistant at the AMS in 1937, and continuing through the 1940s, Sullivan attended several meetings a year of the society in the New York City area.

Mildred Sullivan died suddenly in August 1958 of heart failure at age fifty while visiting relatives at her family's home in the Dorchester neighborhood of Boston, Massachusetts. She is buried in Holyhood Cemetery in Brookline.

Organizational affiliations: AMS, MAA, Phi Beta Kappa.

Thesis and dissertation:
1931(?) The theory of quadratic residues. Minor thesis, Radcliffe College.
1932 On the derivatives of Newtonian and logarithmic potentials near the acting masses. PhD dissertation, Radcliffe College, directed by Oliver Dimon Kellogg. Summary: *Radcliffe College. Graduate School of Arts and Sciences. Summaries of theses accepted in partial fulfilment of the requirements for the degree of doctor of philosophy* 1:62–65. See also **1933**.

Publications:
1933 On the derivatives of Newtonian and logarithmic potentials near the acting masses. *Trans. Amer. Math. Soc.* 35:137–71. Published version of PhD dissertation. Reviews: *JFM* 59.0484.01 (J. Lense); *Zbl* 006.01605 (O. D. Kellogg). Presented with O. D. Kellogg by title as "On the derivatives of potentials on the boundary" to the AMS, New York City, 31 Oct 1931; abstract: *Bull. Amer. Math. Soc.* 37:819–20 #350.
1935 with O. D. Kellogg. The boundary values of potentials and their derivatives – their dependence on the boundary. *Mem. Amer. Acad. Arts Sci.* 18:1–47. Presented by Sullivan as "Newtonian potentials as functions of the masses" to the AMS, Atlantic City, NJ, 27 Dec 1932; abstract: *Bull. Amer. Math. Soc.* 39:23 #3.

Abstract not listed above:
1934 On the partial derivatives of harmonic functions as functionals of the determining boundaries. *Bull. Amer. Math. Soc.* 40 (9, pt. 1): 662 #289. Presented by title to the AMS, Williamstown, MA, 7 Sep 1934.

References to: AmMSc 7–8, 9P.
"Dr. Mildred Sullivan." *New York Times*, 31 Aug 1958.

Other sources: Owens questionnaires 1937, 1940; US Census 1900, 1910, 1920, 1930 MA; Massachusetts death certificate.

Last modified: July 20, 2009.

SULLIVAN, Sister M. Helen. April 10, 1907–December 22, 1998.
St. Benedict's College (BA 1930), Catholic University of America (MA 1931, PhD 1934).

Monica Elizabeth Sullivan was the fourth of nine children of Mary E. (Majerus) (1876–1947) and John Edward Sullivan (b. 1873), both from Rulo in the southeastern corner of Nebraska. Her mother graduated from high school in nearby Falls City; her father attended Nebraska State Normal School (now Peru State College) and St. Benedict's College in Atchison, Kansas. He was a teacher for eight years before becoming a banker, land owner, and community leader in Kansas. Her parents were married in 1897 and lived in Rulo until after the birth of their second son in 1903. The family then moved across the state line to Effingham, Kansas, where the seven youngest children were born. The other children in the family were: Paul Justin (1899–1950), Leo Bernard (1903–1978), Nellie C. (1905–1980), Edward Stephen (b. 1909), Agnes (1912–1987), Mary Margaret (Sister Bede) (1915–1993), Rita (b. 1917), and Teresa Catherine (b. 1920). Of these, all had some college education, one became a priest, and one became a Benedictine Sister.

Elizabeth Sullivan attended parochial schools in Kansas: in Effingham 1913–19, at St. Peter's parish grade school in Mercier 1919–20, and at Mount St. Scholastica Academy in Atchison 1921–25. After graduating as class valedictorian in 1925, she attended Mount St. Scholastica Junior College 1926–28 and then St. Benedict's College 1928–30. Mount St. Scholastica did not grant degrees as a senior college until 1932.

Sullivan joined the Benedictine Sisters in 1925, professed into the Order of St. Benedict in 1930, and as Sister Mary Helen Sullivan continued her studies at the Catholic University of America. In 1981 she described the situation at that time.

> As a young sister, just as I was finishing college, my superior called me and said she would like me to go into physics, and I said, "physics?" Then she said, "Well, what do you like?" And I said, "Well, I like languages and philosophy." She said, "Well, we need somebody in physics." So I said, "Well, okay I'll give it a try." So I went to Catholic University and I got my master's in physics in '31. I learned, meanwhile, that you build your own equipment and you do this sort of thing. It wasn't very enticing to think I was going to be engaging in building equipment when I got this degree. So I talked to her and also I got ill for a period in there, and I think she realized that probably this was going to be too much of a strain. So, we talked to the dean of the graduate school and ... it was no problem to switch me over to math. (Smithsonian meeting tapes)

Three years after receiving her master's degree, she earned her doctorate in mathematics with a dissertation directed by Aubrey E. Landry and with a minor in physics and mechanics.

After receiving her PhD in 1934, Sister M. Helen Sullivan returned to Mount St. Scholastica College, where she had taught in the summer of 1931. She reported in 1981 that "one of the advantages of going into a religious community is you don't have to seek your jobs; I was assigned. I came home with my degree and started teaching everything in the program that I could handle. I taught fifteen hours my first year and believe you me it wasn't easy. It is probably one of the reasons I had to have sick leave... (Smithsonian meeting tapes 1981). Emma Olson replaced her and served as acting head of the department second semester 1934–35, and M. Gweneth Humphreys replaced Sister Helen as head of the department 1935–36. Sister Helen was away during two more early periods because of illness.

Sister Helen remained at the college, except for leaves, sabbaticals, and other experiences, until 1970, after which Mount St. Scholastica and St. Benedict's officially merged to

become Benedictine College. She was instructor 1934–37, assistant professor 1938–45, professor 1945–70, and professor emeritus after 1970. Sister Jo Ann Fellin, retired Benedictine College faculty member, relayed to one of the authors that in addition to two sabbatical leaves at universities, Sister Helen was away 1937–38, 1945–46, and 1954–57, and that at two intervals she "was assigned to administrative work as principal in Louisiana, Iowa, and Kansas."

Sister Helen was chairman of the mathematics department 1934–54 and after her return from a three-year leave in 1957; she was chairman of the division of mathematics and natural sciences 1963–70. In about 1936 she organized Euclid's Circle, the mathematics club that preceded the founding by her in 1940 of the Kansas Gamma chapter of Kappa Mu Epsilon. In 1981 Sister Helen wrote that, "my entire teaching career has been both successful and happy. Of special significance to me was my Undergraduate Research Program funded by N.S.F. [1963–67]. Because of this, students of mine had eighteen published papers. Our mathematics program was an Honors Program and we have many Master's Degrees and seven or eight doctorates. This, I feel, is unusual for a small liberal arts college for women in the mid-West" (Smithsonian questionnaire). Furthermore, during her last few years there, Sullivan was the campus coordinator of the junior year abroad program for the Institute of European Studies.

During the period Sister Helen was at Mount St. Scholastica College, she engaged in post-doctoral study, held a number of visiting positions, and participated in various national professional organizations. She engaged in research and study at Université Laval, Quebec City, Canada, summer 1950; the University of Oklahoma, Norman, summer 1962; and Clare College, Cambridge University, England, summer 1964. She was a visiting professor at Loyola University (then referred to as Loyola University of the South and now officially Loyola University New Orleans) 1948–49 and summer 1949. During that summer she taught using her notes, "The Christian Approach to Science: A Philosophic Integration for Science Majors in Liberal Arts Colleges." A copy of these typewritten notes is among the papers Sullivan donated to the Smithsonian Institution in 1981 (see Papers by Sister Helen Sullivan). In the summers of 1953 and 1954 she was a visiting professor at Fort Smith Junior College (now University of Arkansas Fort Smith), and in summer 1968 she was also a visiting professor at Wesleyan University in Connecticut.

Sullivan was an NSF visiting lecturer in the graduate school of the University of Detroit in summers 1960 and 1963 and taught in NSF summer institutes at Rosary Hill College in Buffalo, New York, in 1965, and at Claflin University, a historically black university in Orangeburg, South Carolina, in 1965 and 1966. Also in 1966 she took a course at Rockhurst College in Kansas City, Missouri, and participated in workshops at Argonne National Laboratory near Lemont, Illinois, in order to be able to introduce a computer course at Mount St. Scholastica. She was visiting professor at the University of Minnesota and, part time, at the College of St. Catherine in St. Paul, Minnesota, during 1964–65 while on sabbatical leave. While in Minnesota, Sullivan participated in the NSF sponsored College Geometry Project as part of a textbook writing team.

During the 1960s Sullivan's activities were reported in the Mount St. Scholastica Kappa Mu Epsilon periodical *The Exponent*. The October 1965 issue noted that

> Sister Helen spent six weeks this summer teaching in a N.S.F. Institute at Claflin University .... She taught two sections of "Foundations of Modern Mathematics" to 65 Institute members, all of whom were Negroes.
>
> When asked how she received this assignment, Sister Helen explained that she had remarked last March in St. Paul that she would rather teach the Negro than join in a "Sympathy-for-Selma" march. A few days later she received a letter asking her to do just that at Claflin Univeristy. (p. 2)

Among her many professional activities were several sponsored by NSF. In addition to her involvement with the undergraduate research program at Mount St. Scholastica and the visiting lectureships noted above, she was NSF visiting lecturer for high schools in Kansas; she was a participant in three NSF institutes for college teachers of mathematics; she was a member of an eight-person writing team at the University of Minnesota to produce college geometry materials; and she served on NSF panels to read and evaluate proposals in Washington, D.C.

Sister Helen was also active in mathematical organizations. Her work with MAA included contributing to the *Guidance Pamphlet* issued by the Post-War Commission of the MAA, serving on the state committee appointed by MAA to evaluate standards proposed by CUPM for undergraduate mathematics programs, and serving as the vice chairman of the Kansas Section 1946–47 and chairman 1947–48. She was often faculty sponsor of the Mount St. Scholastica chapter of the mathematics honor society Kappa Mu Epsilon. A scholarship was established in 1965 by the alumnae of the Kansas Gamma Chapter of Kappa Mu Epsilon and named the Sister Helen Sullivan scholarship in her honor in 1967. Her contributions to the national Kappa Mu Epsilon, which included serving as national historian 1943–47 and as assistant editor of its journal *Pentagon* 1943–47 and 1961–70, were first recognized when she was named one of fifty Distinguished Members of KME at their fiftieth anniversary celebration in 1981 (see Certificate of Recognition). Ten years later KME honored her with the George R. Mach Distinguished Service Award.

After Sullivan left Mount St. Scholastica College in 1970, she held a variety of teaching, studying, and administrative positions both abroad and in this country. In the spring of 1970, as a member of an international curriculum committee of the Institute of European Studies, she made on-site evaluations of study centers of some major European universities. In the summer of 1970 she was an American consultant in mathematics for US AID at the University of Aurangabad, India. This was followed by a year on sabbatical leave, 1970–71, as visiting professor under the International Cultural Exchange in Ireland at University College, Galway. The following year she was consultant, academic counselor, and tutor in mathematics at the Institute of European Studies at the University of Vienna in Austria.

After returning to this country she served as director of development at Lillis High School in Kansas City 1972–73 and as assistant director, Diocesan Office of Education in Billings, Montana, 1973–75. The following year she engaged in graduate study in theology at Gonzaga University in Seattle.

In 1976 Sister Helen moved to Berkeley, California, where she remained for most of the next decade. While there she was research assistant to the dean and faculty, Jesuit School of Theology, 1976–77; assistant to the president, Graduate Theological Union, 1977–78; assistant to the president of the School of Applied Theology 1978–79; and development research specialist for Catholic Charity Services in Oakland 1978–81. In the early 1980s, she was a member of spiritual direction and retreat teams at the School of Applied Theology in Berkeley.

Sister Helen Sullivan returned to Atchison, Kansas, in 1985 and lived in the Dooley Center, a care facility at Mount St. Scholastica Monastery. She died there in 1998 at age ninety-one. Burial was in the Sisters' Cemetery.

Organizational affiliations: AMS, MAA, NCTM, AWM, Math. Assoc. of Great Britain, Amer. Phys. Soc., Nat. Council of Administrative Women in Ed., AAUP, Pi Mu Epsilon, Kappa Mu Epsilon.

Thesis and dissertation:

1931 A critical study of cosmic rays. MA thesis (physics), Catholic University of America. Typescript.

1934 The number and reality of the non-self-symmetric quadrilaterals in and circumscribed to the rational unicuspidal quartic with a line of symmetry. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The

Catholic University of America, Washington, DC, by J. H. Furst Co., Baltimore, MD. Review: *JFM* 60.1272.04 (O. H. Keller).

Publications:

1938 Retracing "Euclid's Circle." *Sci. Counselor* 4 (3): 70,85–86.
1943 A seminar plan in mathematics. *Natl. Math. Mag.* 17:170–73.
1944a Catholic leadership founded on reverence. *Catholic Ed. Rev.* 42:414–19.
1944b Is mathematics a liberal art or a lost art? *Catholic Ed. Rev.* 42:222–27.
1944c It can be done. *Catholic Library World* (December) 16: 78–80,88.
1944c Mathematics in the open forum. *Natl. Math. Mag.* 18:276–79.
1945 Opportunities for women trained in mathematics. *Pentagon* 4 (2): 5–15.
1946a Mathematics in the scheme of life. *Catholic Ed. Rev.* 44:296–300.
1946b A positive approach to vocations. *J. Religious Instruction* 16:810–16.
1947 Mathematics for women. *Catholic Ed. Rev.* 45:160–65. Presented to the MAA and the Kansas Assoc. of Teachers of Mathematics, Emporia, 13 Apr 1946; abstract: *Amer. Math. Monthly* 54:67–68 #2. Reprint of abstract: In *A Century of Mathematics Through the Eyes of the Monthly*, ed. John Ewing, 171. Mathematical Association of America, 1994.
1949 *The Christian Approach to Science: A Philosophic Integration for Science Majors in Liberal Arts Colleges*. Typewritten. [Atchison, KS: Mount St. Scholastica College].
1950 Bede, the scientist. *Benedictine Rev.* 5 (2): 39–42.
1951a A philosophic synthesis of the sciences. *Catholic Ed. Rev.* 49:21–27.
1951b A realistic view of differential calculus. *Math. Mag.* 24:101–103.
1952 *An Introduction to the Philosophy of Natural and Mathematical Sciences*. New York: Vantage Press. Successor to **1949**. Reviews: *Benedictine Rev.* 7 (2): 69–70 (Rev. E. Kilzer); *Amer. Benedictine Rev.* 5 (1): 80–81 (W. A. Coggin). Rev. ed.: 1960. New York: Vantage Press.
1956 Quantitative thinking - a correlating factor. *Catholic Educator* 27:224–27,240.
1967 Geometry, Analytic. In *New Catholic Encyclopedia*, 6:352–53. New York: McGraw-Hill.
1971a A "Canterbury Tale": Impressions of an American Benedictine sister. *The Benedictines* 26:62–68.
1971b Catholicism in Ireland, as I see it. *The Furrow* 22:615–21.
1973 The experimental college: a cool medium. *Improving College and University Teaching* 21:265–68.

Abstracts not listed above:

1950 A philosophic synthesis of the sciences. *Amer. Math. Monthly* 57:590 #5. Presented to the MAA, Pittsburg, KS, 22 Apr 1950.
1955 Some philosophic considerations of mathematics. *Amer. Math. Monthly* 62:618. Presented as invited address to the MAA, Winona, MN, 7 May 1955.
1959 A geometric number system. *Amer. Math. Monthly* 66:629 #1. Presented to the MAA, Salina, KS, 11 Apr 1959.

References to: AmMSc 10P–11P; AmMWSc 12P; WorWhoW 5.
"Sister Helen Sullivan: A College Teacher and More." In *Women Mathematicians and NMAH Collections* (NMAH Object Group).

Related manuscript materials: Sister Helen Sullivan Collection (1993.3019), Material Collected at August 31, 1981, Meeting of Women PhDs, Mathematics Collections, National Museum of American History, Smithsonian Institution, Washington, DC.

Other sources: PhD dissertation vita 1934; Owens questionnaire 1940; Smithsonian questionnaire 1981; Smithsonian meeting tapes 1981; communications with Jo Ann Fellin, OSB, and with University of Oklahoma Office of the Senior Vice President and Provost; Jo Ann Fellin, OSB, "History and Information, Kansas Gamma Chapter, Kappa Mu Epsilon"; US Census 1900, 1910, 1920, 1930 KS.

Last modified: January 14, 2016.

SUTTON, Flora Dobler. June 7, 1890–June 23, 1976.
Goucher College (BA 1912), Johns Hopkins University (PhD 1921).

Flora Dobler Sutton, born in Baltimore, Maryland, was the daughter of Ann (or Annie) Elizabeth Dobler (1860–1928), of Baltimore, and John Robert Sutton (1858–1938), originally of Washington, D.C. Her parents married in 1886 and had seven children: Virginia (1887–1974), John R. Jr. (b. 1889), Flora D., Walter D. (1891–1970), Mary (1893–1994), Paul W. (b. 1894), and Franklin W. (1895–1978). All were born in Maryland, most likely in Baltimore, where the family lived. Her father was in the dry goods business.

Flora Dobler Sutton attended public schools in Baltimore and entered nearby Woman's College of Baltimore (Goucher College after 1910) immediately after her graduation from Western High School in 1908; she received her BA from Goucher in 1912. At that time the mathematics department was staffed by Clara Latimer Bacon, who had come in 1897 and who was to receive her doctorate from Johns Hopkins in 1911, and by Florence P. Lewis, who joined the faculty in 1908, and who was to receive her PhD, also from Johns Hopkins, in 1913.

In 1915, three years after graduating from Goucher, Sutton entered the Johns Hopkins University, where she took courses in mathematics, education, and statistics. At the time of her initial application for graduate study, she indicated that she did not expect to become a candidate for a degree. She did course work during the next six years, however, beginning with three hours per week in 1915–16 and six hours per week in 1916–17. She also attended summer school in 1919. Her mathematics courses included theory of functions, theory of numbers, theory of groups, elliptic modular functions, theory of probability, vector analysis, finite groups, and several in higher geometry. Her courses in education were taken during each of her first four years at Johns Hopkins. She took a course in statistical methods in the political economy department, and she enrolled in January 1920 as a special student in the Johns Hopkins School of Hygiene and Public Health to take additional courses in statistics. Her PhD dissertation in algebraic geometry was directed by Frank Morley, and the handwritten copy is dated 1920, although the degree was granted in June 1921.

During 1922–23 Sutton replaced an associate who was on leave from the Department of Biometry and Vital Statistics in the School of Hygiene and Public Health at Johns Hopkins. According to the announcement of her appointment in the *Journal of the American Statistical Association*, she had "for some time been connected with the Department in one capacity or another" (18 (1922): 401). At the time of the 1930 census Sutton was living at her family home in Baltimore with her widowed father, two sisters, and a brother; her occupation was given as substitute teacher in high school. She was still living at her family home when she applied in February 1936 to take graduate courses in the Department of Political Economy at Johns Hopkins. Courses taken there in 1936 included one on the interpretation of financial statements.

Sutton spent the major part of her career as a statistician for a stock brokerage firm in Baltimore that was known as Mackubin, Legg & Co. when she joined them, and is now Legg Mason, Inc.

Flora Sutton's brother, Walter, was a foreign missionary. In a letter that appears in the summer 1959 *Goucher Alumnae Quarterly* she described a recent trip to visit him in Southeast Asia. She reported, "Around the world by air in 35 days was a marvelous experience. There was a momentous decision to be made. Would it be safe for women, my two sisters, a sister-in-law and myself to visit Tavoy, Burma? A chapel was to be dedicated on Jan. 4, 1959, in memory of our missionary brother's wife, who died in India, whither they had fled because of the Japanese invasion" (p. 48). After consulting the State Department and the Missionary Board they decided to make the trip. On the way there,

they visited Copenhagen, Rome, Istanbul, the Taj Mahal, and Rangoon; their trip home passed through Thailand, Singapore, Hong Kong, and Japan.

Sutton had been retired for more than twenty years when she died at age eighty-six of cardio-respiratory arrest in the Armacost Nursing Home in Baltimore; she was buried in the Druid Ridge Cemetery in Baltimore and was survived by a sister and two brothers.

Dissertation:
1920 On certain chains of theorems in reflexive geometry. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Handwritten. Printed version, 1923, reprinted from *Amer. J. Math.* 45:122-44. PhD granted 1921.

Publication:
1923 On certain chains of theorems in reflexive geometry. *Amer. J. Math.* 45:122-44. Published version of PhD dissertation. Review: *JFM* 49.0424.03 (A. Barneck).

Reference to:
"Dr. Sutton, 86, Was Statistician." *Baltimore Sun*, 3 Jul 1976.

Other sources: PhD dissertation vita 1920; Ferdinand Hamburger Archives, The Johns Hopkins University; communication with Goucher College Alumnae Association (via Rochelle Adler Effron); Cockey, "Mathematics at Goucher"; US Census 1900, 1910, 1920, 1930 MD; Maryland death certificate; SSDI.

Last modified: December 13, 2008.

TAPPAN, Helen. October 22, 1888–November 10, 1971.
Western College for Women (BA 1909), Cornell University (MA 1912, PhD 1914).

Anna Helen Tappan was born in Mount Pleasant, Iowa, the ninth of eleven children of Anna (Grand-Girard), born in 1850, and David Stanton Tappan (1845–1922), natives of Ohio who married in 1869. Her father earned a bachelor's degree in 1864 and a master's degree in 1866 from Miami University in Oxford, Ohio, and graduated from the Western Theological Seminary in Allegheny, Pennsylvania, in 1867. He was ordained as a Presbyterian minister and held various academic and pastoral positions before and after serving as president of Miami University 1899–1902. Tappan Hall there is named for him. Helen Tappan's siblings were Benjamin (1871–72), Oella Stanton (1873–1952), Julia May (1875–1972), Paul Whiting (1877–ca. 1954), David Stanton Jr. (1880–1968), Frank Girard (b. 1882), Lucy Frederica (1884–1900), George Herdman (1886–1950), Edwin Stanton (1890–1892), and Margaret (1894–1972). Of the seven siblings who survived to adulthood, one brother became a physician, another became a missionary in China, and her youngest sister earned a doctorate in education.

In 1905 Helen Tappan graduated from Everts High School in Circleville, Ohio, where her father was pastor of the Presbyterian Church. She then attended Western College for Women in Oxford, Ohio; she graduated with honors in 1909 and was an instructor there for the next two years. In 1911 Tappan enrolled at Cornell University where she was to remain for the next three years. She received her master's degree in 1912 with a major in pure mathematics and a minor in mathematical physics. She was a scholar 1912–13 and an Erastus Brooks fellow 1913–14 before receiving her PhD in 1914 with work in algebraic geometry as a student of Virgil Snyder. For her doctorate Tappan presented minors of mathematical analysis and philosophy.

After receiving her doctorate, Tappan joined the faculty at Iowa State College of Agriculture and Mechanic Arts (now Iowa State University of Science and Technology) in Ames. She remained for eleven years: as instructor 1914–18, assistant professor 1918–22, and associate professor 1922–25. Others on the mathematics faculty at Iowa State in that period included Julia T. Colpitts and Fay Farnum.

In 1925 Tappan returned to Western College for Women as professor of mathematics and head of the department. She also served as dean of women from 1927 until 1941 and as academic dean from 1941 until 1944, when she resigned that position to return to full-time teaching. She was head of the department at the time of her retirement in 1954 as academic dean emeritus. In 1957–58 she served as acting head of the mathematics department. When she retired, it was noted that she had spent part of her summers in southern California with relatives and that she planned to make her home with her sister and niece in Pasadena.

Western College honored her in 1953 as one of the ten outstanding living alumnae and again in 1954 with an honorary Doctor of Humane Letters degree. In 1974 the college merged with Miami University, which created an interdisciplinary program, the Western College Program, to continue Western's then current approach to education. In 1990 the Western program established a peer learning center called the Anna Helen Tappan Center for Computer Assisted Learning, whose tutors are called Tappan Tutors. Tappan House, the third and fourth floors of Barton Hall at Iowa State University, is also named in her honor.

In about 1940 Tappan described herself as a Presbyterian and a Republican with interests in reading and dramatics; "her singular ability in dramatics contributed to the success of one of the first faculty plays" at Western College (Nelson, *The Western College for Women*, 138). Her travels in Great Britain, Europe, and the United States included a

trip to Europe with friends in the summer of 1928. After her retirement Tappan moved to South Pasadena, California.

Helen Tappan died in 1971 at age eighty-three at the Westover Retirement Home in Hamilton, Ohio, after a long illness. A memorial service was held at nearby Western College where the Helen Tappan Memorial Fund was established.

Organizational affiliations: AMS, MAA, AAAS, Sigma Delta Epsilon, Nat. Assoc. of Deans of Women, NEA, AAUW, AAUP, Sigma Xi, Pi Mu Epsilon.

Thesis and dissertation:
1912 The relations between the theorems of Pappus and Desargues in the foundations of geometry. MA thesis, Cornell University, directed by Virgil Snyder. Typescript.
1914 Plane sextic curves invariant under birational transformations. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1915, reprinted from *Amer. J. Math.* 37:309–36.

Publication:
1915 Plane sextic curves invariant under birational transformations. *Amer. J. Math.* 37:309–36. Published version of PhD dissertation. Reviews: *JFM* 45.0826.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 25, pt. 1: 2 (E. B. Cowley). Presented by title as "Plane sextic curves invariant under a group of linear transformations" to the AMS, New York City, 30 Dec 1913; abstract: *Bull. Amer. Math. Soc.* 20:289 #6.

References to: AmMSc 3–8, 9P; AmWom 1935–40; WhAm 8; WhoAmEd 1; WhoAmW 1.
"Tappan, Davies Retire from Faculty in May." *Western Round-Up*, 14 May 1954.

Related manuscript material:
President: 1899–1902. David S. Tappan. Papers. Miami University Archives.

Other sources: Owens questionnaire 1937; Division of Rare and Manuscript Collections, Cornell University Library; Western College Memorial Archives (at the Miami University Libraries); Miami University Archives; communications with Iowa State University Archives and with Western College Alumnae Association; Narka Nelson, *The Western College for Women* (Oxford, OH: Western College, 1967); NatCAB 21 (Tappan, David Stanton); WhAm 1 (Tappan, David Stanton); US census 1870 IA, 1900, 1910 OH, 1920 IA, 1920 CA, 1930 OH.

Last modified: July 20, 2009.

TAYLOR, Mildred E. July 25, 1898–November 3, 1978.
Oxford College for Women (BA 1921), University of Illinois (MA 1922, PhD 1931).

Mildred Ellen Taylor, born in Virginia, Illinois, was the eldest of eight children of Emily Elizabeth (Treadway) (b. 1874) and Angus Taylor (b. 1872), natives of Illinois. Her parents married in 1897, and her father was a farmer in the central part of the state. The other children in the family were William Marion (1900–1997), Miriam (1902–1989), Kenneth Archibald (1904–1996), Angus Donald (1907–1982), Emily Christine (1909–1995), Vivian (1914–2003), and Miza (1916–1989).

Mildred Taylor graduated from the high school in Virginia, Illinois, in 1917 and entered Oxford College for Women in Ohio that fall. In 1918–19 and 1920–21 she was a special student at Miami University doing course work in physics. While at Oxford College, which merged with Miami University in 1928, she was involved in many activities including the athletic association and YWCA all four years. After her graduation in 1921, she received a scholarship from the University of Illinois for the year 1921–22. She received her master's degree in 1922 and taught the next year in the Johnston City Township high school in southern Illinois.

From 1923 until 1929 Taylor taught as an instructor at Knox College in Galesburg, Illinois. During this time she was working toward her PhD at the University of Illinois and regularly attended meetings of the Illinois Section of the MAA. She took a leave of absence from Knox 1929–30 to spend her only full year in residence at the University of Illinois. All of her other course work occurred during the summers 1924 to 1926 and 1927 to 1930. She received her doctorate in 1931 with a dissertation in algebraic geometry and with a minor in physics.

In 1930 Taylor was hired as professor of mathematics and department head at Mary Baldwin College in Staunton, Virginia. This college for women, originally chartered in 1845, became first a seminary, then a junior college, and in 1923 a four-year college. When Taylor arrived in 1930 there were approximately 250 students. In 1937 her title changed to professor of mathematics and astronomy. She remained at Mary Baldwin until her retirement in 1968. Throughout her career at Mary Baldwin, Taylor attended national meetings of the AMS and the MAA and meetings of the Maryland-District of Columbia-Virginia Section of the MAA. In 1938 she was elected to the executive committee of the section, and in 1953 she was elected its vice chair.

Taylor was also active in Pi Mu Epsilon, Sigma Delta Epsilon, and the AAUW. She was chair of the national alumnae committee of Sigma Delta Epsilon 1942–43 and was secretary of the Virginia branch of the AAUW in 1940–41. She attended a number of annual meetings of the NCTM in the 1950s; she was chairman of the ushers and secretaries committee in Chicago in 1950, and she gave talks about teaching geometry at the college level in Atlantic City and Cincinnati in 1953 and 1954. She indicated in about 1940 that she was a Presbyterian and a Republican.

Mildred Taylor was living in Staunton, Virginia, at the time of her death at age eighty in 1978. She was survived by her three brothers and four sisters. The funeral service was held at the First Presbyterian Church in Staunton, and she was buried in East Lawn Memorial Park in Urbana, Illinois.

Organizational affiliations: AMS, MAA, NCTM, AAAS, Sigma Delta Epsilon, AAUW, Pi Mu Epsilon.

Dissertation:
1931 A determination of the types of planar Cremona transformations with not more than 9 F-points. PhD dissertation, University of Illinois, directed by Arthur Byron Coble. Abstract, 1932, reprinted from *Amer. J. Math.* 54:123–28.

Publications:
1932 A determination of the types of planar Cremona transformations with not more than 9 F-points. *Amer. J. Math.* 54:123–28. Abstract of PhD dissertation. Reviews: *JFM* 58.1220.02 (G. Feigl); *Zbl* 003.36104 (O. Zariski).
1954 Mina Spiegel Rees. *Pi Mu Epsilon J.* 1:395–99.

References to: AmMSc 5–8, 9P–11P; AmMWSc 12P; AmWom 1935–40.
"Mildred Taylor, Former Teacher at MBC, Dies." *Richmond Times-Dispatch*, 5 Nov 1978.

Other sources: PhD dissertation abstract vita 1932; Owens questionnaires 1937, 1940; Miami University Archives; US Census 1900, 1910, 1920, 1930 IL; SSDI.

Last modified: March 9, 2009.

THORNTON, Marian (Wilder). July 18, 1905–September 30, 1992.
University of Minnesota (BA 1927, MA 1930, PhD 1933).

Marian Augusta Wilder, born in Shakopee, Minnesota, just southwest of Minneapolis, was the daughter of Minnie Florence (Buchanan) (b. 1870) and George D. Wilder (b. 1866), both natives of Minnesota. At the time of the 1900 census her parents had been married a year, her father was a sash and door commercial traveler, and they had an infant daughter, Lois. In 1910 the family was living in St. Paul, her father was a salesman, and there were two surviving children, Lois and Marian, of three born. They were living in Minneapolis in 1920 and 1930.

All of Marian Wilder's university work was done at the University of Minnesota, where she earned her bachelor's degree in 1927, her master's degree in 1930, and her doctorate in 1933. After she received her BA, Wilder was a high school teacher in Minnesota for the next two years, 1927–29. She returned to the university in 1929, where she was an assistant in mathematics 1929–31 and an assistant in biometry 1931–34. Wilder worked with the noted biometrician and botanist J. Arthur Harris, who headed the Minnesota botany department from 1924 until his death in 1930; she published three papers with him. Wilder received her master's degree in 1930 with a major in mathematics and a minor in education; her thesis dealt with the mathematical theory of statistics. She then completed her doctoral work with a major in mathematics and a minor in biometry. She remained at the university as a graduate fellow in the biometric laboratory 1933–34, the year after she received her PhD.

Wilder worked as a statistician at the Mayo Clinic 1934–35 and then returned to the University of Minnesota, where she was hired as a research statistician and instructor for 1935–36. She wrote in her 1937 questionnaire for Helen Owens that she had "been patient in sanitarium since Nov 1935 ready to begin work again Jan 1938." She is likely to have been at the Glen Lake state tuberculosis sanitarium, which was located in Oak Terrace, Minneapolis, her address on the September 1936 AMS membership list. She was a research statistician for the committee on educational research in the college of education in the late 1930s.

Wilder was a statistician with the division of preventable diseases of the Minnesota State Department of Health from 1938 or 1939 until 1942. Her work in the late 1930s and early 1940s focused on the use of statistics in medical and psychological data.

On August 27, 1938, Marian Wilder married G. Parnell (Barney) Thornton (1907–1968). They remained in the Minneapolis–St. Paul area. Her address on membership lists from ASA and IMS show her living in St. Paul from about 1943. In February 1954, when she applied for her social security number, she was living in St. Paul and was a substitute at the College of St. Catherine College in St. Paul. Later Thornton again worked for the University of Minnesota in Minneapolis. In 1966 her name appears on a list of graduate faculty in the Biometry Division of the School of Public Health, College of Medical Sciences. In 1970–71 she was listed in the CML, the combined membership list of mathematics societies, as living in Minneapolis and as being an associate professor at the university; she does not appear in subsequent lists.

Thornton was living in St. Louis Park, Minnesota, just west of Minneapolis, at the time of her death at eighty-five in September 1992. Her husband, Barney, and sister, Lois, predeceased her. There was a mass of Christian burial at Most Holy Trinity Church in St. Louis Park, and she was buried in Omaha, Nebraska.

Organizational affiliations: AMS, MAA, ASA, IMS, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1930 [Wilder, M. A.] Dynamical analogies in the theory of correlation. MA thesis, University of Minnesota. Typescript.

1933 [Wilder, M. A.] Some problems in closest approximation over a discrete set of points. PhD dissertation, University of Minnesota, directed by Dunham Jackson.

Publications:

1929 [Wilder, M. A.] with J. A. Harris and B. Gunstad. Influence of change of sex on the intensity of heredity. *Proc. Soc. Exp. Biol. Med.* 26:851–54.

1930a [Wilder, M. A.] with J. A. Harris and A. E. Treloar. On the theory of contingency: II. Professor Pearson's note on our papers on contingency. *J. Amer. Statist. Assoc.* 25:323–27. Response to On the theory of contingency: I. Note on Professor J. Arthur Harris' papers on the limitation in the applicability of the contingency coefficient, by Karl Pearson, 320–23. Followed by On the theory of contingency: III. Postscript, by Karl Pearson, 327; and IV. Note by the editor, 327.

1930b [Wilder, M. A.] with J. A. Harris and C. Tu. The biologic significance of certain differences between correlation coefficient, correlation ratio, and contingency coefficient. *Amer. J. Bot.* 17:175–85.

1931 [Wilder, M. A.] Correlation coefficients and transformation of axes. *Amer. Math. Monthly* 38:64–66. Reviews: *JFM* 57.0624.04 (G. Schulz); *Zbl* 001.15101 (K. Christensen). Presented to the AMS, Providence, RI, 12 Sep 1930; abstract: *Bull. Amer. Math. Soc.* 36:644.

1934 [Wilder, M. A.] with A. E. Treloar. The adequacy of "Student's" criterion of deviations in small sample means. *Ann. Math. Statist.* 5:324–41. Review: *JFM* 60.1173.02 (A. C. Aitken). Presented to the Econometric Soc. and Section K of the AAAS, Boston, MA, 30 Dec 1933.

1935 [Wilder, M. A.] with K. K. Nygaard and J. Berkson. The relation between viscosity of the blood and relative volume of erythrocytes (hematocrit value). *Amer. J. Physiol.* 114:128–31.

1937 [Wilder, M. A.] with A. C. Eurich and H. P. Longstaff. *The Effect of Weekly Examinations upon Achievement in Psychology.* The Effective General College Curriculum. Univ. of Minnesota Press.

Technical reports (University of Minnesota Committee on Educational Research):

1937–38 [Wilder, M. A.] Mathematics examination study. 6 pts. Pts. 1–2, Mathematics 1 Higher Algebra (pt. 1, 1937 W; pt. 2, 1937 S), presented as "Examination techniques in higher algebra" by J. H. Daoust to the MAA, St. Paul, MN, 15 May 1937; abstract: *Amer. Math. Monthly* 44:422 #12. Pts. 3–5, Mathematics 4 Trigonometry (pt. 3, 1937 S; pt. 4, 1938 W; pt. 5, 1938 S), presented as "Note on experimental testing in trigonometry" by M. A. Wilder to the MAA, Collegeville, MN, 14 May 1938; abstract: *Amer. Math. Monthly* 45:564 #5. Pt. 6, Summary of 1937–38.

1938a [Wilder, M. A.] Effect of differentiating power of an item of various criteria used for separating into top, middle, and low groups.

1938b [Wilder, M. A.] Effect of presence of undifferentiating items on reliability of examination. Presented to the Minn. Soc. Study Educ., 1939.

1938c [Wilder, M. A.] English test – correspondence of items in grammar and usage.

1938d [Wilder, M. A.] English theme study.

1938e [Wilder, M. A.] Factor analysis of comprehensive examination in General College in S 1937. Presented to the Minn. Soc. Study Educ., 1938.

1938f [Wilder, M. A.] Reflective thinking examination in General College 1938 S.

1939a [Wilder, M. A.] Differentiating power of items in various criterion groups.

1939b [Wilder, M. A.] Discriminating power of items in different forms of same test.

1939c [Wilder, M. A.] Extrovert – introvert study.

1939d [Wilder, M. A.] Proctor Gamble test vs. honor point ratio.

1939e [Wilder, M. A.] Tuttle School. 4 pts. Pt. 1, Prediction of Simon-Binet I.Q.'s from group tests at earlier grade levels, presented by T. R. McConnell to the Minn. Soc. Study

Educ., 1939. Pt. 2, An example of analysis of variance technique. Pt. 3, Analysis of variance study of group tests for I.Q. Pt. 4, Prediction of achievement test results.

Technical reports (Minnesota State Department of Health):
1939 [Wilder, M. A.] with Tendeland and Prudhon. Comparison of Kline exclusion, Kline diagnostic, and Kolmer blood tests.
1940 [Wilder, M. A.] with Tendeland and Prudhon. Use of routine Wassermanns in maternity cases by Minnesota hospitals.

Abstracts not listed above:
1930 [Wilder, M. A.] A derivation of the equation for the normal surface. *Amer. Math. Monthly* 37:340 #2. Presented to the MAA, Northfield, MN, 17 May 1930.
1934 [Wilder, M. A.] The adequacy of student's z test. *Amer. Math. Monthly* 41:63–64 #4. Presented to the MAA, St. Paul, MN, 13 May 1933.

References to: AmMSc 6–7.
"Thornton." (Funeral notice) *Minneapolis Star Tribune*, 2 Oct 1992.

Other sources: Owens questionnaires 1937, 1940; application for social security account number 1954; communication with Minnesota Historical Society; *Minnesota Bulletin*, Register of PhD's; US Census 1900, 1910, 1920, 1930 MN; SSDI.

Last modified: August 3, 2009.

THUENER, Sister M. Domitilla. October 25, 1880–September 29, 1977.
St. Xavier College (BA 1920), Catholic University of America (Catholic Sisters College) (MA 1923), Catholic University of America (PhD 1932).

Eleanor Margaret Thuener was born in Allegheny, Pennsylvania, the daughter of Josephine (b. 1861) and August Thuener (b. 1856). Her mother was born in Pennsylvania and her father in Germany. He immigrated to the United States in about 1870, and her parents married in about 1879. In the 1900 census her father is described as a driver; in 1910 as a brewery driver. It appears that three children survived of seven who were born. They were Eleanor, Viola [or Violet R.] (b. 1893), and John Lester (1897–1980). Her mother was widowed by 1920.

Eleanor Thuener received her elementary education in public and parochial schools in Allegheny. In the 1900 census she was described as a sewing girl. She graduated from St. Mary's Academy, a Catholic boarding school in Monroe, Michigan, in June 1905, when she was nearly twenty-five, shortly before entering the convent of the Benedictine Sisters in Covington, Kentucky, that summer. She took the religious name Mary Domitilla. From 1905 until 1920 Sister M. Domitilla taught in St. Walburg Academy in Covington and in Villa Madonna Academy, a boarding school for girls run by the Benedictine Sisters in nearby Crescent Springs, Kentucky, across the Ohio River from Cincinnati.

Sister Domitilla obtained her bachelor's degree in 1920 from St. Xavier College (Xavier University since 1930), a Jesuit college for men in Cincinnati, Ohio, by attending special extension classes, scheduled for late afternoons, Saturdays, and summers, arranged for the sisters from neighboring congregations. Sister Mary Henrietta Reilly also attended St. Xavier under similar circumstances. In 1922–23 Sister Domitilla studied at the Catholic Sisters College associated with the Catholic University of America in Washington, D.C., and received her master's degree in 1923.

Villa Madonna College in Covington was founded by the Benedictine Sisters in 1921 for the education of the sisters of the community and for lay women in northern Kentucky. Sr. Domitilla was the first dean, the senior officer who directed the academic work of the new college, and was the mathematics instructor from 1921 until 1929, when it graduated its first class of five students. In 1929 the college came under diocesan control and was jointly administered by three different religious orders. It was also in 1929 that Sister Domitilla returned to Catholic University, where she completed the work for her PhD in 1932 with a dissertation in algebraic geometry and with minors in physics and education. Upon her return to Villa Madonna College she was professor and department head until 1943; she also taught physics 1934–37. The college became coeducational in 1945. In the late 1960s it relocated to Crestview Hills, Kentucky, and was renamed Thomas More College.

In 1943 Sister M. Domitilla was elected by her community to be the Prioress of St. Walburg Convent. She served two successive terms as administrator and religious leader. In this period she was a member of the board of trustees of Villa Madonna College. Under her direction the community entered hospital work by taking over the administration of a hospital in Kentucky and by staffing a hospital in Colorado. Sister Domitilla was considered to be the "prime mover" in furthering the education of Sister Elizabeth Frisch, O.S.B., who obtained a PhD in 1940 from Catholic University and who followed her as head of the mathematics department at Villa Madonna College.

Sister Domitilla Thuener died at Villa Madonna in Covington, Kentucky, at age ninety-six in 1977.

Organizational affiliations: AMS, MAA.

Thesis and dissertation:
1923 The quadratic law of reciprocity. MA thesis, Catholic Sisters College of the Catholic University of America. Typescript.

1932 On the number and reality of the self-symmetric quadrilaterals in-and-circumscribed to the triangular-symmetric rational quartic. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC.

Abstract:
1936 The number and reality of the self-symmetric quadrilaterals in and circumscribed to the triangular-symmetric rational quartic. *Amer. Math. Monthly* 43:64 #3. Presented to the MAA, Lexington, KY, 4 May 1935. Based on PhD dissertation.

Reference to: AmMSc 7.

Other sources: Owens questionnaires 1937, 1940; Catholic University of America Archives; communication with Saint Walburg Monastery (KY); M. Irmina Saelinger, *Retrospect and vista: the first fifty years of Thomas More College, formerly Villa Madonna College*, 1971: 1–8; US Census 1900, 1910 PA, 1930 DC, 1930 KY.

Last modified: December 13, 2008.

TORRANCE, Esther (McCormick). August 12, 1909–January 3, 1978.
Barnard College (BA 1931), Cornell University (MA 1932), Brown University (PhD 1939).

Esther Ober McCormick was the elder of two surviving children of Ethel Mary (Ober), born in Ohio in 1879, and Thomas Holmes McCormick, born in Indiana in 1875. Her parents were both students at Hiram College in Ohio; her mother was there for one year, 1900–01, and her father graduated in 1902, shortly before their marriage in June of that year. Their first daughter died in infancy.

Esther McCormick was born in Fort Wayne, Indiana, where her father was a mathematics teacher at Fort Wayne High School. At some point her mother gave guitar lessons. Her younger brother, Edgar T. McCormick (1914–1991), was born in New York City after the family moved there in the summer of 1913. Edgar McCormick later attended Princeton University and became an analyst for Prudential Life Insurance. An avid and successful chess player, he also was chess team coach for Prudential. For a few years, the family lived in New York City where her father was a teacher of mathematics at the Commercial High School and occasionally served as a substitute preacher. He continued to teach at the high school after the family moved to East Orange, New Jersey. Esther McCormick graduated from Eastern Grammar School in East Orange in 1923 and from East Orange High School in 1927.

McCormick attended Barnard College, Columbia University, where she majored in mathematics and studied primarily with Lulu Hofmann (Bechtolsheim) and Edward Kasner. She took several graduate courses at Columbia in addition to her undergraduate work. She joined the AMS in the summer of 1930 and attended two meetings of the society before she received her bachelor's degree in February 1931.

She immediately entered graduate school at Cornell for the second term of the academic year 1930–31 and returned to Columbia for graduate work during the summer of 1931. She had a graduate scholarship at Cornell for 1931–32 and received her master's degree in February 1932, having done her work in geometry and written her master's thesis with Virgil Snyder. She stayed at Cornell through the end of that academic year before going to Brown University for the year 1932–33 with a scholarship and part-time work.

While a student at Cornell, McCormick met Charles Chapman Torrance, who had received a PhD in mathematics from Cornell in 1931 and was an instructor there from 1927 until 1931. C. C. Torrance (1902–1967) was born in Yonkers, New York, and had earned an ME in 1922 and an MA in 1927 from Cornell. He spent 1931–32 as an instructor at Stanford and 1933–34 at the Institute for Advanced Study in Princeton. During 1933–34 Esther McCormick traveled in Europe before marrying Charles Torrance on June 19, 1934. A daughter later reported that a professor at Cornell told her that Charles was brilliant, and that the best contribution she could make to the world of mathematics was to marry him and keep him happy and productive.

C. C. Torrance was a member of the faculty at Case School of Applied Science in Cleveland, Ohio, from 1934 until 1946 and was a contract mathematician at the Bureau of Ordnance of the Navy Department at Washington, D.C., 1944–45. At Case he was instructor 1934–40, assistant professor 1940–44, and associate professor 1945–46.

Esther Torrance was an instructor at Oberlin College 1937–38. Both of the Torrances were in residence at the Institute for Advanced Study in Princeton during 1938–39. A daughter reported that hers was a courtesy invitation while C. C. Torrance was working with von Neumann. During that year Charles and Esther Torrance translated an article by Arnaud Denjoy of the Institut Henri Poincaré that appeared in the *Duke Mathematical Journal*. Esther Torrance finished the work for her PhD at Brown in 1939.

After several miscarriages, two daughters were born, both of whom later earned doctorates. Ellen McCormick was born in March 1941, did her undergraduate work at Barnard,

received a master's degree from Stanford, and received a PhD in mathematics in 1968 from the University of Illinois at Urbana-Champaign. Wendy was born in April 1942, did her undergraduate work at Occidental College in Los Angeles, and received a PhD in physics in 1971, also from the University of Illinois.

In 1946 C. C. Torrance moved to the Naval Postgraduate School in Annapolis, Maryland, and was associate professor 1946–50 and professor 1950 until his retirement in May 1967. When the school moved to Monterey, California, in December 1951, the Torrances moved to the West Coast. Esther Torrance taught in high school in Salinas for a brief time in the late 1950s or early 1960s. Her husband died very soon after his retirement, and afterwards Esther Torrance moved to Fresno. She was assistant professor at Fresno State College (California State University, Fresno since 1972) from 1967 until her retirement in 1972, after an unsuccessful bid for tenure. She moved back to Monterey after her retirement.

Esther Torrance was described by her younger daughter as "formal and forbidding, but would go way out of her way to be of service." When they lived in Annapolis, she was particularly active in a number of community organizations, serving as an advisory member of the Anne Arundel Youth Commission, as a member of the Annapolis Planning Commission, and on the board of directors of the Citizens Planning and Housing Association of Annapolis and Anne Arundel County. She was also a registered lobbyist in Congress for a housing coalition. According to her younger daughter, "she idolized Jane Addams of Hull House." She played the stock market for both fun and profit and played chess by mail and bridge. She loved long walks and camping in Yosemite, where every summer she and the girls would camp two to three weeks and be joined by her husband for a shorter time. In August 1977, a few months before her death, she climbed Mt. Whitney, the tallest mountain in the contiguous United States. At this time, too, she was working for passage of the ERA. She was a member of the Disciples of Christ and was active in the Pacific Grove church.

After a series of strokes and heart attacks in December 1977 and early January 1978, Esther Torrance died in January 1978 at age sixty-eight in Monterey, California.

Organizational affiliations: AMS, AWM.

Thesis and dissertation:

1932 [McCormick, E. O.] Quadratic plane transformations. MA thesis, Cornell University. Typescript.

1939 Superposition on monotonic functions. PhD dissertation, Brown University, directed by Jacob David Tamarkin. Typescript. Printed version, 1940, reprinted from *Duke Math. J.* 6:307–17.

Publications:
1938 Superposition on monotonic functions. *Fund. Math.* 30:90–91. Reviews: *JFM* 64.01-87.02 (S. Kempisty); *Zbl* 018.34902 (H. Blumberg). Presented to the AMS, State College, PA, 10 Sep 1937; abstract: *Bull. Amer. Math. Soc.* 43:626.
1940 Superposition on monotonic functions. *Duke Math. J.* 6:307–17. Published version of PhD dissertation. Reviews: *JFM* 66.0213.01 (A. Bischof); *MR* 01,303c (J. A. Clarkson); *Zbl* 023.30601 (G. Alexits). Presented in part as "Superposition on monotonic functions II" to the AMS, New York City, 6 Sep 1938; abstract: *Bull. Amer. Math. Soc.* 44:638.

Abstract not listed above:
1932 [McCormick, E. O.] On reduction of space Cremona involutions. *Bull. Amer. Math. Soc.* 38:488. Presented by title to a meeting of the AMS, Los Angeles, 30 Aug–2 Sep 1932.

References to: AmMWSc 12P–13P, 14.

Other sources: MA thesis vita 1931; PhD dissertation vita 1939; conversation with Ellen Torrance and communications with Wendy Torrance Padgett 1998; Division of Rare and Manuscript Collections, Cornell University Library; communication with Hiram College Archives; US Census 1900 OH, 1900 1910 IN, 1920 1930 NJ; SSDI.

Last modified: June 23, 2011.

TORREY, Marian M. December 9, 1893–September 16, 1971.
Brown University (Women's College) (BA 1916), Brown University (MA 1917), Cornell University (PhD 1924).

Marian Marsh Torrey was born in Malden, Massachusetts, the daughter of Anna Louise (Marsh), born in 1859 in Vermont, and Daniel Temple Torrey, born of missionary parents in 1859 in Fairfield, Indian Territory, in what was later northeastern Oklahoma. Her parents married in about 1890. Daniel T. Torrey, at one time a Congregational minister in Massachusetts, was by 1900 an insurance agent in Providence, Rhode Island, where Marian Torrey grew up. Four children were living in 1910 of seven that had been born by that time. The eldest, George Safford (1891–1977), received a bachelor's degree in 1913 and a master's degree in 1915 from Harvard and a diplômé d'études supérieures in botany from the University of Paris in 1919. He was a member of the botany faculty 1915–53 at Connecticut Agricultural College, which became the University of Connecticut in 1939. Marian Torrey's two younger sisters were Katharine Adelaide (1896–1990), who became a teacher, and Anna St. John (1897–1919).

Marian Torrey attended the Northfield Seminary, a preparatory school for girls in Massachusetts, 1909–12 before entering Women's College in Brown University in Providence. She graduated as a mathematics major in 1916. Torrey received the Emma Josephine Arnold fellowship of $500 for 1916–17 to continue her studies at Brown and received her master's degree at the end of the year. Letters in the spring of 1917 make it clear that Torrey planned to take two or three years off before continuing her work towards a doctorate and an eventual career in college teaching. Among letters in response to inquiries from Raymond Clare Archibald of Brown about possible positions for Torrey was one on April 9 from A. E. Young of Miami University in Ohio, noting that "it is against our general policy to employ women in the Liberal Arts College" (R. G. D. Richardson Papers, Correspondence, Brown University Archives).

Torrey taught mathematics at the St. Johnsbury Academy in Vermont and then taught for two years at the Phebe Anna Thorne Model School at Bryn Mawr. While teaching at the Model School she also took two courses at Bryn Mawr College. She was then an instructor at West Virginia University 1920–23. While on the faculty there, she attended two summer quarters at the University of Chicago, the last in 1923 when she started a course with E. J. Wilczynski and planned to complete her studies at Chicago under his direction the following year. That summer Wilczynski's health forced him to give up teaching, and, at the suggestion of R. G. D. Richardson at Brown, Torrey wrote to Virgil Snyder at Cornell University to inquire about credit for her previous graduate work and the possibility of finishing her work at Cornell. She enrolled at Cornell in the fall of 1923 and received her PhD the following June with a minor in physics. Contact names at that time included her brother George Torrey, Richardson at Brown, and Margaret Buchanan (Cole) at West Virginia University.

On February 13, 1924, while Torrey was finishing her doctoral work at Cornell, R. G. D. Richardson at Brown wrote a letter in her behalf to Ruth Goulding Wood at Smith. In it, he said, "The department [at Brown] feels that we have never had, among the twenty or more girls whom we have sent out to teach in colleges, any stronger candidate. She comes from a cultured family, has a rare gift of getting along with people, and is very competent mathematically.... If Brown University would employ women, I would not hesitate to ask President Faunce to call her here at a good salary. She would do much better than many of the men whom we have at present on our staff" (R. G. D. Richardson Papers, Correspondence 1921–1925, Folder W, Brown University Archives).

After receiving her PhD, Torrey spent one year as an instructor at the University of Illinois before going to Goucher College as an instructor in 1925. She was promoted to assistant professor in 1927, to associate professor in 1932, and to professor in 1942. She

spent a sabbatical year, 1931–32, studying at Columbia University. While at Goucher she served as chairman of the department 1943–57; assistant to the dean for academic affairs 1937–43; and head of a resident dormitory, Baldwin House, 1942–59. She retired from Goucher in 1959. Goucher's annual banquet of the Mathematics Club and its prize for outstanding scholarship in mathematics are named in her honor.

Torrey began attending meetings of the MAA before she received her doctorate and continued attending for at least thirty years. She served as chair of the Maryland–District of Columbia–Virginia Section 1952–53 and on the arrangements committees for the annual meetings of the AMS and the MAA held at Johns Hopkins University in December 1953.

In the late 1930s Torrey described her church affiliation as Congregational. She mentioned renovating old houses as a hobby and listed bridge, bowling, and walking as favorite recreations. Torrey died in her apartment in Towson, Maryland, at the age of seventy-seven in 1971.

Organizational affiliations: AMS, MAA, IMS, Sigma Delta Epsilon, AAUP, Phi Beta Kappa, Sigma Xi.

Dissertation:

1924 Classification of monoidal involutions having a fixed tangent cone. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1925, reprinted from *Amer. J. Math.* 47:181–206.

Publications:

1925 Classification of monoidal involutions having a fixed tangent cone. *Amer. J. Math.* 47:181–206. Published version of PhD dissertation. Reviews: *JFM* 51.0490.03 (W. Fr. Meyer); *Rev. semestr. publ. math.* 32, pt. 1: 3 (E. B. Cowley).

1932 Some properties of the fundamental curves of a birational transformation in space. *Amer. J. Math.* 54:305–13. Review: *JFM* 58.1222.01 (G. Feigl).

References to: AmMSc 5–8, 9P; AmWom 1935–40; WhAm 5.

"Dr. Torrey, Former Goucher Professor, Dies at Age 77." *Baltimore Sun*, 17 Sept 1971.

Other sources: Owens questionnaire 1940; Brown University Archives (R. G. D. Richardson Papers); Division of Rare and Manuscript Collections, Cornell University Library; Cockey, "Mathematics at Goucher"; US Census 1900, 1910, 1930 RI, 1930 MD.

Last modified: July 20, 2009.

TULLER, Annita. December 30, 1910–August 29, 1994.
Hunter College (BA 1929), Bryn Mawr College (MA 1930, PhD 1937).

Annita Tuller was the daughter of Ida (Bick) (1883–1931) and Morris Tuller (1886–1934), natives of Russia who were likely Jewish. Her mother had attended religious school and her father the equivalent of high school before they came to the United States in 1908. Her parents married in November 1909, Annita was born a year later in Brooklyn, New York, and a brother, Theodore, was born in 1916. Her mother was a housewife, her father was a jeweler, and her brother later became a physician.

Annita Tuller received her primary and secondary education in the public schools of Brooklyn. She graduated from Erasmus Hall High School in 1925 at age fourteen and entered Hunter College that same year. In 1985 Tuller recalled from her Hunter experience that Carolyn Eisele, her freshman mathematics teacher, "inspired me, as an undergraduate, to change my major from French to Math," and the "lectures [of Louis Weisner] on Non-Euclidean Geometry focussed my interest in geometries" (Smithsonian questionnaire). In her dissertation vita, she thanked Lao G. Simons of Hunter "who suggested I do graduate work in math."

In the fall of 1929, after her graduation from Hunter, Tuller entered, as a graduate scholar, Bryn Mawr College, where her first graduate school instructor was Anna Pell Wheeler, whom she described as "a role model for me, [who] inspired me to go on to the Ph.D." (Smithsonian questionnaire). After earning her master's degree at the end of the academic year 1929–30, she returned to Hunter, at age nineteen, as a substitute instructor in mathematics for a year. From 1931 to 1935 she was a mathematics and physics teacher at William Cullen Bryant High School in Long Island City, Queens, New York. She returned to Bryn Mawr, as a resident fellow 1935–36 and as a graduate scholar 1936–37. She completed her work for the PhD with a dissertation in differential geometry written under the direction of Gustav A. Hedlund, whom she later indicated, "encouraged me all the way" (Smithsonian questionnaire).

Tuller became a tutor at Hunter College in the fall of 1937, just after she received her Bryn Mawr PhD. She was in Europe in the summer of 1938. On November 23, 1938, she married Morris Levine (1912–1983) of Brooklyn, who worked for, and later became circulation manager for, a newspaper publishing firm in New York. The Levines had two daughters, Judith, born in 1942, and Diane, born in 1944. Judith graduated from the University of Southern California and did graduate work later. Diane graduated from Swarthmore College and earned a PhD from Columbia University in 1973 in language and modern literature.

Annita Tuller, who continued to use her maiden name professionally, remained on the faculty at Hunter College: as tutor 1937–39, instructor 1939–49, assistant professor 1949–61, and associate professor 1961–68. She was teaching at the Bronx campus of Hunter when it became an independent college, Herbert H. Lehman College (CUNY), in 1968. She then taught at Lehman as professor and retired as professor emeritus on February 1, 1971.

During her career at Hunter and at Lehman, Tuller taught a variety of undergraduate courses as well as graduate courses in non-Euclidean geometry, modern geometries, analytic projective geometry, and differential geometry. She taught in an NSF summer institute in 1959 and in an academic year institute in 1965–66. She gave a number of talks, mainly in geometry; two were to the Veterans Math Club at the Fort Trumbull Division of the University of Connecticut in 1949 and 1950. From 1958 to 1970, as a member of the MAA Speaker's Bureau, she spoke in high schools in the New York metropolitan area. She was active in the Metropolitan New York Section of the History of Science Society, for which she was chairman of the hospitality committee in the mid-1950s and was treasurer from 1959 for about a decade. She also was a member of the New York Academy

of Sciences. Tuller did several pre-publication reviews for publishers, reviewed a number of books for *Scripta Mathematica*, worked for *Collier's Encyclopedia* on a revision of a bibliography in mathematics, and, most notably, wrote a widely used and admired text, *A Modern Introduction to Geometries*, which appeared in 1967.

When her children were in elementary school, Tuller was active in the PTA. Later she did community work as a member of the Briarwood Community Association and volunteer work recording mathematics texts for the blind. She was a member of UNA-USA (United Nations Association of the United States of America), the US Committee for UNICEF, Common Cause, AARP, and was a registered Democrat.

Annita Tuller moved to a residence for senior citizens in Cupertino, California, after suffering a serious heart attack in early 1993. She was living there at the time of her death at age eighty-three in 1994.

Organizational affiliations: AMS, MAA, AAAS, AAUW, AAUP, Hist. Sci. Soc., Phi Beta Kappa, Pi Mu Epsilon.

Dissertation:

1937 The measure of transitive geodesics on certain three-dimensional manifolds. PhD dissertation, Bryn Mawr College, directed by Gustav Arnold Hedlund. Printed version, 1938, reprinted from *Duke Math. J.* 4:78–94.

Publications:

1938 The measure of transitive geodesics on certain three-dimensional manifolds. *Duke Math. J.* 4:78–94. Published version of PhD dissertation. Reviews: *JFM* 64.0765.04 (G. A. Hedlund); *Zbl* 018.27301 (E. Hopf). Presented to the AMS, State College, PA, 7 Sep 1937; abstract: *Bull. Amer. Math. Soc.* 43:467–68 #284.

1956 Review of *Mathematics in Action*, by O. G. Sutton. *Scripta Math.* 22:248.

1960a Review of *Anschauliche Mathematik*, I Teil: *Geometrie*, by A. Baur, H. Lode, and A. Albrecht. *Scripta Math.* 25:152–53.

1960b Review of *Der Vierdimensionale Raum*, by R. W. Weitzenböck. *Scripta Math.* 25:68.

1961a Review of *Introduction to Geometry*, by H. S. M. Coxeter. *Scripta Math.* 26:256–57.

1961b Review of *Lectures in Projective Geometry*, by A. Seidenberg. *Scripta Math.* 26:359–60.

1964 Trigonometry. In *Encyclopedia Americana* 27:103–10.

1967a *A Modern Introduction to Geometries*. University Series in Undergraduate Mathematics. Princeton, NJ: D. Van Nostrand Co. Reviews: *Amer. Math. Monthly* 79:531–32 (B. Meyer); *Math. Gaz.* 53:102-4 (W. J. Langford); *MR* 34 #6607 (T. G. Room); *Zbl* 143.43802 (R. Lingenberg). Student paperback issue: 1967. London: D. Van Nostrand. Review: *J. London Math. Soc.* (D. R. Hughes) 43:559–60.

1967b Review of *The Number Systems and Operations of Arithmetic*, by O. M. Klose. *Sci. Books, A Quart. Rev.* 2 (4): 257.

1967c Review of *Projective and Euclidean Geometry*, by W. T. Fishback. *Scripta Math.* 28:62.

1970 Review of *Foundations of Euclidean and Non-Euclidean Geometries According to F. Klein*, by L. Redei. *Scripta Math.* 28:361.

References to: AmMSc 6–8, 9P–11P; AmMWSc 12P–13P, 14–24; WhoAmW 7.

Other sources: PhD dissertation vita 1938; Owens questionnaire 1940; Smithsonian questionnaire 1985; Bryn Mawr College Alumnae Files; Bryn Mawr College Archives; US Census 1920, 1930 NY; SSDI.

Last modified: March 9, 2009.

TURNER, Bird M. April 18, 1877–September 5, 1962.
West Virginia University (BA 1915, MA 1917), Bryn Mawr College (PhD 1920).

Bird Margaret Turner was the second child and first of four daughters of Mary Jane (Douglas) (1847–1917) and John Marion Turner (1838–1910). Her parents were natives of Virginia (West Virginia after statehood in 1863) and married in 1873. Her father was a farmer in the Moundsville area in the northwest panhandle of West Virginia from before her birth in Moundsville until his retirement. Her brother, Will D., was two years older than she, and her three sisters were Lulu (1879–1953), Carrie (b. 1881), and Dess (1887–1949).

Bird Turner graduated from the Moundsville high school in 1893 and taught in the Moundsville area for most of the next two decades. She taught at Wood Hill school, a county grade school, 1895–96, and in Moundsville 1896–1900, where she taught fourth, seventh, and eighth grades. She taught mathematics in the Moundsville high school 1900–1913. Starting in 1900 she took summer courses toward her undergraduate degree: at West Virginia University in 1900, at Harvard University in 1907, at Bethany College in West Virginia in 1909 (spring and summer), and again at West Virginia University in the summers 1910, 1912–14. She was a student assistant at West Virginia University 1913–15 and received her BA there in 1915, at age thirty-eight, with majors in mathematics and physics. She was a member of the social sorority Kappa Kappa Gamma and the English club and won the Chi Omega prize in economics. Turner was an instructor in the summer school at West Virginia University in 1915, returned to Moundsville as principal of the high school for the year 1915–16, and was instructor in the summer school at West Virginia again in the summer of 1916.

Turner began her graduate work as a scholar in mathematics at Bryn Mawr College in the academic year 1916–17. During that first year she took a "seminary" in differential geometry, one in formal algebra, one in education, and the journal club in mathematics. She was granted the (honorary) President M. Carey Thomas European fellowship for her first year's work. She received her master's degree from West Virginia University in 1917 and was assistant director of the Phebe Anna Thorne Model School of Bryn Mawr College 1917–18; she lists the Model School as her affiliation for the January 1920 MAA meeting in New York City. Turner was a reader in mathematics at Bryn Mawr College during 1918–19, and, as a resident fellow during 1919–20, she finished her dissertation under the direction of Charlotte A. Scott. While at Bryn Mawr, she had studied under Scott, Olive C. Hazlett, Anna Johnson Pell (Wheeler), and Matilde Castro. Turner was Scott's sixth, and next-to-last, PhD student and was forty-three when she received her doctorate. Between the ages of forty-five and fifty-two she published three articles in the *American Journal of Mathematics* and two in the *Annals of Mathematics*.

Turner was an instructor at the University of Illinois for three years after she received her PhD in 1920. In 1923 she returned to West Virginia University, and in November of the following year she gave a talk at the organizational meeting of the West Virginia Academy of Science. She was assistant professor 1923–25, associate professor 1925–31, and professor 1931–47. In 1947, at age seventy, she retired as professor emeritus. A colleague at West Virginia University was Margaret Buchanan Cole, who had also received a BA from West Virginia and who overlapped with Turner in her studies at Bryn Mawr before receiving her PhD in 1922.

Four years after her retirement, Turner returned to Moundsville, where she was a member of the Moundsville Presbyterian Church and the Moundsville Women's Club. She was a Republican. Bird Turner died in her home in Moundsville, West Virginia, at age eighty-five in 1962. She was survived by nieces and nephews and was buried in Mt. Rose Cemetery in Moundsville.

Organizational affiliations: AMS, MAA (charter member), AAAS, Phi Beta Kappa.

Dissertation:
1920 Plane cubics with a given quadrangle of inflexions. PhD dissertation, Bryn Mawr College, directed by Charlotte Angas Scott. Printed version, 1922, reprinted from *Amer. J. Math.* 44:261–78.

Publications:
1922a On the positions of the imaginary points of inflexion and critic centers of a real cubic. *Ann. of Math.* 2nd ser., 23:287–91. Reviews: *JFM* 49.0462.01 (G. Feigl); *Rev. semestr. publ. math.* 31, pt. 2: 17 (W. A. Wythoff).
1922b Plane cubics with a given quadrangle of inflexions. *Amer. J. Math.* 44:261–78. Published version of PhD dissertation. Reviews: *JFM* 48.0731.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 31, pt. 1: 2 (E. B. Cowley).
1924 Plane cubics associated with the quadrangle-quadrilateral configuration. *Ann. of Math.* 2nd ser., 26:47–58. Reviews: *JFM* 50.0431.04 (G. Feigl); *Rev. semestr. publ. math.* 32, pt. 1: 20 (E. B. Cowley).
1925 A configuration of thirteen pencils of cubics and cubics with three real inflexions. *Amer. J. Math.* 47:149–62. Reviews: *JFM* 51.0514.01 (W. Fr. Meyer); *Rev. semestr. publ. math.* 32, pt. 1: 2–3 (E. B. Cowley).
1930 An application of the Laguerre method for the representation of imaginary points. *Amer. J. Math.* 52:75–84. Review: *JFM* 56.0556.07 (M. Zacharias).

Presentation not listed above:
A configuration of pencils of cubics. Presented to the West Virginia Acad. Sci., Morgantown, WV, 28 Nov 1924.

References to: AmMSc 4–8, 9P–10P; AmWom 1935–40; BioWMath; Poggendorff 6, 7b.
"Dr. Turner Dies at Moundsville." *Morgantown (WV) Post*, 6 Sep 1962.
"Dr. Bird Turner, Veteran Teacher, Died Suddenly." *Moundsville (WV) Echo*, 7 Sep 1962.

Other sources: PhD dissertation vita 1922; Owens questionnaires 1937, 1940; Bryn Mawr College Archives; communication with West Virginia University Archives; Kenschaft, "The students of Charlotte Angas Scott"; US Census 1880, 1900, 1910, 1920 WV.

Last modified: March 9, 2009.

TURNER, Mary (Haberzetle). June 4, 1912–November 16, 1983.
Saint Xavier College for Women (BS 1934), University of Chicago (MS 1936, PhD 1938).

Mary Barbara Haberzetle was born in Chicago, Illinois, the first of two daughters of Helen (Martin) (1886–1978) and William Thomas Haberzetle (1881–1955), both born in Chicago. Her parents married in 1911. Her mother, orphaned at an early age, worked to support herself when young and determined that her children would receive an excellent education. Her father was a saloon keeper in business with his brother. The younger daughter, Florence, was born in 1914 and received her bachelor's degree from DePaul University in 1936 and a master's degree from Chicago Teachers College in 1941. She worked as a secretary for a few years and then taught in the Chicago public schools for twenty-six years.

Mary Haberzetle received her primary and secondary education in parochial schools in Chicago run by the School Sisters of Notre Dame; she attended St. Anthony Grammar School and Academy of our Lady (also called Longwood Academy), where she was the top scholar in her graduating class of 1930.

Haberzetle entered Saint Xavier College for Women (now Saint Xavier University) in Chicago, where she held a four-year scholarship, majored in mathematics, and graduated with honors in 1934. During her studies at Saint Xavier, she was especially encouraged to do graduate work and urged to apply for a fellowship at the University of Chicago by Emily Pixley, a mathematics professor at Saint Xavier and a 1933 Chicago PhD.

After graduating from Saint Xavier, Haberzetle worked as a social worker for the Cook County Welfare Department 1934–35 before beginning her graduate work at the University of Chicago in the autumn quarter of 1935. After receiving her master's degree in 1936, she was a fellow her last two years of graduate study and received her doctorate in 1938.

Haberzetle taught at Mount Holyoke College in the first semester of 1938, replacing Frances Baker who was on leave, and at Queens College in New York City 1939–1941. Between 1937 and 1941 she published four papers. Her 1941 paper was mentioned that year by Hans Rademacher in an AMS invited address, "Trends in research: The analytic number theory," that appeared in the *Bulletin* of the AMS in 1942. Generalizations by others of the results in **1941** appeared over the next twenty years. Although **1941** was submitted for publication after her marriage, it appeared under the name Mary Haberzetle.

On January 27, 1940, Mary Haberzetle married M. Jonathan Turner (1915–1995), who had received a master's degree in mathematics from the University of Chicago in 1937. He was a mathematics instructor 1937–40 and received an MS in aeronautical engineering from New York University in 1941. He worked as an engineer in structural technology for the United Aircraft Corporation in Stratford, Connecticut, from 1941 until 1949 when they moved to Seattle where he spent the rest of his career at the Boeing Company.

Three children were born while they were in Connecticut: William Charles in 1942, Richard James in 1944, and Katherine Marie in 1947. All received PhD's from the Yale graduate school in the 1970s: William and Richard in physics in 1973 and 1972, respectively, and Katherine in physical chemistry in 1976. Richard also received an MD from the University of Miami in 1974.

In 1960, when the children were in their teens and approaching college age, Mary Turner resumed her teaching by taking a position at Seattle University as an assistant professor; she was promoted to associate professor in 1963 and became a full professor in spring 1971 shortly before the onset of illness hastened her retirement in June that year. Her sister, Florence H. Baker, of Florida, has written that, "she had talent as an artist and enjoyed all the arts – painting, music, and weaving. She also enjoyed outdoor activities, hiking, mountain climbing, and snow-shoeing which she enjoyed during her retirement years."

Mary Haberzetle Turner died in Seattle, Washington, in 1983 at age seventy-one.

Organizational affiliation: AMS.

Thesis and dissertation:

1936 [Haberzetle, M.] Representation of large integers by cubic polynomials. MS thesis, University of Chicago. Typescript.

1938 [Haberzetle, M.] Two new universal Waring theorems. PhD dissertation, University of Chicago, directed by Leonard Eugene Dickson. Typescript. Private edition, 1939, distributed by the University of Chicago Libraries, reprinted from *Duke Math. J.* 5:49–57 and *Amer. J. Math.* 61:357–64.

Publications:

1937 [Haberzetle, M.] Representation of large integers by cubic polynomials. *Amer. J. Math.* 59:55–56. Reviews: *JFM* 63.0126.02 (W. Weber); *Zbl* 016.05401 (G. Pall).

1939a [Haberzetle, M.] The Waring problem with summands $1 + bx^n$. *Amer. J. Math.* 61:357–64. Part of published version of PhD dissertation. Reviews: *JFM* 65.0149.02 (W. Weber); *Zbl* 022.11503 (W. Weber). Presented as "Two new universal Waring theorems" to the AMS, Chicago, 8 Apr 1938; abstract: *Bull. Amer. Math. Soc.* 44:336 #203.

1939b [Haberzetle, M.] The Waring problem with summands x^m, $m \geq n$. *Duke Math. J.* 5:49–57. Part of published version of PhD dissertation. Reviews: *JFM* 65.0149.01 (W. Weber); *Zbl* 022.11502 (W. Weber). Presented as "Two new universal Waring theorems" to the AMS, Chicago, 8 Apr 1938; abstract: *Bull. Amer. Math. Soc.* 44:336 #203.

1941 [Haberzetle, M.] On some partition functions. *Amer. J. Math.* 63:589–99. Reviews: *JFM* 67.0126.03 (H. D. Kloosterman); *MR* 3,69b (H. Rademacher); *Zbl* 025.25203 (V. Jarník).

Other sources: MS thesis vita 1936; PhD dissertation vita 1938; authors' questionnaire 1991 (prepared by her husband); communication with Florence (Haberzetle) Baker and with M. Jonathan Turner 1991; US Census 1920, 1930 IL.

Last modified: June 23, 2011.

VAN BENSCHOTEN, Anna L. August 12, 1866–September 18, 1927.
Cornell University (BS 1894, PhD 1908), University of Chicago (MS 1900).

Anna Lavinia Van Benschoten was born in Elmira, New York, the daughter of Mary Jane (Pugsley) (1841–1885) and Moses M. Van Benschoten (1839–1872), both of New York. During the Civil War, Moses Van Benschoten served in the infantry from May 1861 until May 1863 and again from September 1864 until June 1865. Her parents married in November 1865. In 1870 Anna and her mother, Mary Van Benschoten, a music teacher, were living with Anna's maternal grandfather in Binghamton, New York.

Anna Van Benschoten received her primary and secondary education in the public schools of Binghamton, and she graduated from Binghamton Central High School in 1886. By this time both of her parents had died, and she was listed as boarding with Mary E. T. Ames in an 1888 Binghamton, New York, directory. Ames is later listed as parent or guardian on Van Benschoten's Cornell transcript. Although it is unclear what Van Benschoten was doing throughout the period 1886–91, according to a 1928 letter written by Amy J. Douglass, who lived with Van Benschoten from the end of 1921 until her death in 1927, she traveled in Europe (England, Scotland, France, Germany, Switzerland, and Italy) from June to December 1890.

Van Benschoten enrolled as an undergraduate at Cornell University in 1891 and studied under James E. Oliver, James McMahon, and George W. Jones. Most of the courses she took were in the general area of geometry, although she also took courses in algebra and a year-long seminar on mathematics pedagogy. After graduating from Cornell in 1894, she taught at Binghamton Central High School 1894–98. She spent the summers of 1897 and 1898 and the following two academic years at the University of Chicago before receiving her master's degree in mathematics and astronomy in 1900.

After receiving her master's degree, Van Benschoten spent a year traveling in Europe and taking courses in mathematics and astronomy in Göttingen. In particular, she was in Felix Klein's projective geometry lecture in winter 1900–01. By that time a number of women mathematics students from the United States had studied with Klein and others in Göttingen.

In 1901 Van Benschoten began her college teaching career as professor at Wells College, a women's college in Aurora, New York. She assumed the position of professor that was vacated when Annie MacKinnon (Fitch) married. Van Benschoten was on the faculty at Wells until 1920, except for leaves of absence. During most of her first decade there she was the only one giving instruction in mathematics. During most of her second decade she was joined by one instructor. Van Benschoten first took a leave in the academic year 1906–07 to resume her graduate studies at Cornell before receiving her doctorate in 1908. One of her students at Wells was Anna Mayme Howe, class of 1908, who later earned her PhD in mathematics at Cornell. Van Benschoten had additional leaves during the second semester of 1914–15 and part of 1916–17; Helen Owens replaced her during both of these leaves. Van Benschoten also had a leave of absence 1918–20 after which she retired because of ill health. She spent part of the year 1918 at the University of Arizona teaching mathematics to "boys of the Student Army Corps" (Amy J. Douglass to Foster M. Coffin, 27 February 1928, Box 133, Deceased Alumni Files, #41-2-877, Division of Rare and Manuscript Collections, Cornell University Library) and moved to Whittier, California, in about 1921. According to Douglass, "She gave up continuous teaching because of impaired health due to Rheumatic Arthritis and during her six years of residence in Whittier she did private tutoring" and taught at Whittier College "from January to April 1924." Her obituary indicates that she was at Whittier temporarily to replace a regular faculty member who was away.

Van Benschoten was a charter member of the MAA and was a member of the social sorority Kappa Kappa Gamma. Douglass reported that in addition to her earlier travels

in Europe, Van Benschoten made a third trip abroad to Norway, Sweden, Russia, and Germany, and that she also visited Alaska and Jamaica.

Van Benschoten died in her home in Whittier, California, at age sixty-one. Funeral services took place at St. Matthias Episcopal Church after which her remains were sent to Binghamton, New York, for interment. She left no immediate relatives.

Organizational affiliations: AMS, MAA (charter member).

Thesis and dissertation:
1900 The motion of a particle attracted by a central force varying inversely as the fifth power of the distance. MS thesis, University of Chicago. Typescript.
1908 The birational transformations of algebraic curves of genus four. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1909, Baltimore, MD, reprinted from *Amer. J. Math.* 31:213–52.

Publication:
1909 The birational transformations of algebraic curves of genus four. *Amer. J. Math.* 31:213–52. Published version of PhD dissertation. Reviews: *JFM* 40.0633.02 (E. Löffler); *Rev. semestr. publ. math.* 18, pt. 1: 1 (E. B. Cowley). Presented as "Curves of genus 4 which remain invariant under birational transformation" to the AMS, Ithaca, NY, 6 Sep 1907; abstract: *Bull. Amer. Math. Soc.* 14:67–68 #33.

Abstract not listed above:
1912 Products of quadric inversions and linear transformations in space. *Bull. Amer. Math. Soc.* 18:219 #9. Presented to a meeting of the AMS, New York City, 27–28 Dec 1911.

References to: AmMSc 2–4, WomWWA.
"Anna L. Van Benschoten." (Obituary) *Whittier News*, 19 Sep 1927.

Other sources: MS thesis vita 1900; Rare and Manuscript Collections, Cornell University Library; Universitätsarchiv Göttingen, Niedersächische Staats- und Universitätsbibliothek; communications with Whittier College Archives and with Whittier (CA) Public Library; US Census 1870, 1880, 1910 NY, 1900 IL.

Last modified: December 15, 2008.

VARNHORN, Mary C. July 8, 1914–November 9, 1988.
College of Notre Dame of Maryland (BA 1936), Catholic University of America (MA 1937, PhD 1939).

Mary Catherine Varnhorn was born in Baltimore, Maryland, the daughter of Eleanor (Levy) (b. 1889) and John Henry Varnhorn (1890–1978), natives of Maryland. At the time of the 1920 census, she, her parents, and her brother, John, two years younger than she, were living in Baltimore with her mother's family. At that time her father was a commercial traveler. Later they owned their own home in Baltimore, and her father was described as a solicitor for a food company.

Mary Varnhorn did her undergraduate work at the College of Notre Dame of Maryland in Baltimore, where she was a student of Sister Mary Cordia Karl. After her graduation in 1936 she began her graduate studies at the Catholic University of America in Washington, D.C. She received her master's degree in 1937 and her PhD in 1939, having written a dissertation under the direction of Edward J. Finan, an assistant professor at the time. It was read and approved by Aubrey E. Landry, soon to retire, and J. Nelson Rice.

Varnhorn returned to the College of Notre Dame of Maryland as instructor for the year 1939–40. She then joined the faculty at Trinity College in Washington, D.C., in 1940, six years after the death of Sister Marie Cecilia Mangold, who had directed the department for most of its previous history. When Varnhorn arrived at Trinity College (now called Trinity Washington University), she joined Sister Thomas Marie (Catherine Maloney), an associate professor who was studying for a PhD at Catholic, and Sister Mary Robert (Grandfield), who had joined the faculty the year Sister Marie Cecilia died. Sister Mary Robert left in 1941, and Sister Thomas Marie died rather suddenly in the fall of 1943, leaving the twenty-nine-year-old Mary Varnhorn alone in the department. At first, some courses were taught by Otto Ramler, professor at Catholic University, and then by various others who filled in.

Varnhorn remained at Trinity for the rest of her career. She was instructor 1940–44, assistant professor 1944–45, associate professor 1945–58, and professor 1958–78. From 1945 until her retirement, she was chairman of the department, which usually consisted of at most three people. She initiated a number of curricular changes in the early 1960s and was recognized especially for her commitment to teaching when she received, in 1965, the *Pro Ecclesia et Pontifice* Medal for twenty-five years of service at Trinity College.

Varnhorn maintained her residence in Baltimore throughout her life and commuted into Washington. After her formal retirement in 1978 she taught two courses at Trinity College as an adjunct in the fall of 1978–79, and she taught briefly at Loyola College in Baltimore and at the University of Baltimore. She was a member of the Duodecimal Society of America (Dozenal Society of America since 1980), an organization for the conduct of research and education in the use of the base twelve number system. Varnhorn was a Democrat and a Roman Catholic. She was at one time president of the Mother Seton Mission Crusade Unit, a group devoted to helping the needy.

Mary Varnhorn died at age seventy-four of a respiratory ailment at St. Agnes Hospital in Baltimore in 1988. She was survived by her brother. A memorial liturgy was celebrated at Trinity College on November 28, 1988.

Organizational affiliations: AMS, MAA, AAUP.

Thesis and dissertation:
1937 Some applications of the theory of matrices to polynomial equations. MA thesis, Catholic University of America, directed by Edward Jerome Finan. Typescript.
1939 Some properties of quartic functions of one variable. PhD dissertation, Catholic University of America, directed by Edward Jerome Finan. Printed for The Catholic University of America Press, Washington, DC, by J. H. Furst Co., Baltimore, MD.

References to: AmMSc 7–8, 9P–11P; AmMWSc 12P–13P, 14–18; WhoAmW 1–2.

"Mary C. Varnhorn, Mathematics Professor." (Obituary) *Washington Post*, 19 Nov 1988.

Other sources: Owens questionnaire 1940; Trinity College Archives; communication with College of Notre Dame of Maryland Archives; Mullaly, *Trinity College, Washington, D.C.: The First Eighty Years 1897–1977*; US Census 1900, 1920, 1930 MD.

Last modified: March 9, 2009.

VAUDREUIL, Sister Mary Felice. August 20, 1894–October 27, 1978.
DePaul University (BA 1921), Catholic University of America (PhD 1931).

Annette Vaudreuil was born in Chippewa Falls, Wisconsin, the eldest of five children of Lenora (Blair) (1871–1905) and Ludger J. Vaudreuil (1866–1943). Her mother was born in Wisconsin; her father was born near Québec City in Canada and moved to Wisconsin as a boy. Later he was a lumber merchant in Chippewa Falls. Annette Vaudreuil was ten when her mother died in 1905, and the youngest of the five children was two years old. Her siblings were Fred L. (b. ca. 1897), Irene (b. ca. 1899), Lionel H. (ca. 1901–1959), and Roland Cecil (1903–1996). Her sister, Irene, became a nurse, and her brother Lionel attended the University of Wisconsin. Her father married Marie Caron, a dressmaker, in 1907. Five of six children born of this second marriage lived to maturity.

From the time she was about school age, Annette Vaudreuil's family lived two blocks from the Notre Dame convent, school, and church in Chippewa Falls. She attended the grade school and high school there. She entered the Congregation of the School Sisters of Notre Dame after her graduation from McDonell Memorial High School in 1911, was received in 1913, and took first vows in 1915 and final vows in 1921.

As a novice Sister Mary Felice Vaudreuil was sent to teach in the high school in Escanaba, Michigan. After profession in 1915 she returned to Escanaba but, after one week of teaching, was recalled and sent to teach at the Academy of Our Lady in the Longwood area of Chicago. In October 1915 she enrolled at DePaul University in Chicago. By taking courses that met in the late afternoons, Saturdays, or in the summers, she was able to teach and complete the work for her bachelor's degree, which she received in August 1921. She then took graduate courses in the autumn-winter session at DePaul in French, Latin, and philosophy in 1921–22, and in philosophy, education, and mathematics in 1922–23. She also did graduate work at Creighton University in Nebraska, Marquette University in Wisconsin, and Loyola University of Chicago, presumably in the summers.

Sister Felice taught at the Academy of Our Lady until 1925, when she was transferred to St. Mary's College in Prairie du Chien, Wisconsin. In 1928 she was one of the first two at St. Mary's to be given a sabbatical leave for full-time study. She entered the Catholic University of America in Washington, D.C., and was in residence there from 1928 until she completed her work for the PhD in 1931 with a dissertation in algebraic geometry and minors in education and physics.

After receiving her doctorate, Sister Felice returned to Mount Mary College in Milwaukee, the successor to St. Mary's in Prairie du Chien. She taught mathematics, meteorology, and astronomy and was chairman of the mathematics department. She was lecturer for the graduate school at Loyola University in Chicago for three or four years in the mid-1930s and taught some graduate courses at Marquette University in Milwaukee. Under her direction, a chapter of Kappa Mu Epsilon was established on the Mount Mary campus in 1947, and she served as faculty advisor for many years; each spring the members sponsored a mathematics contest for senior girls and boys in the area. Furthermore, she was active in many state and national professional organizations. She was chairman of the Wisconsin Section of the MAA 1939–40 and 1945–46 and was secretary-treasurer 1953–60; she served on the national MAA Committee on High School Contests 1957–62. At the state level, she was a member of the Wisconsin Education Association and of the Wisconsin Mathematics Council for which she was vice president 1951–52 and president 1952. In 1960 she was a participant in a conference of the Wisconsin State Committee of the North Central Association on problems in articulating mathematics instruction in high school and college. That year she also served as a representative of the AAAS at the annual meeting of the National Commission on Teacher Education and Professional Standards (TEPS) in San Diego.

Among Sister Felice's many notable interests were astronomy and meteorology. She had a three-inch French refractor telescope available for her astronomy classes and was a member of the Milwaukee Astronomical Society. In 1966 she was awarded a pin by the US government for twenty years of volunteer service to the US Weather Bureau as a weather observer. She was also a member of the National Geographic Society.

Sister Felice was described by a colleague as an "excellent French cook, ... a lover of classical music, and especially opera, which she listened to on the radio Saturday afternoons, libretto in hand; ... she loved art and took courses in design in her latter teaching years" (Mount Mary College Archives). She was a bird watcher who kept feeding stations on the campus and was also described as a linguist, philosopher, seamstress, and bridge player.

Sister Felice retired to the motherhouse in Mequon from Mount Mary College in 1967. Hearing of the need for a mathematics teacher in a nearby college, she taught a course there for a few years. After her retirement she also studied to be a ham radio operator and was able to contact Guam and other locations where there were missionary sisters.

In 1972 Sister Mary Felice Vaudreuil entered the Notre Dame Health Care Center in Elm Grove, Wisconsin, and died there six years later at age eighty-four.

Organizational affiliations: AMS, MAA, NCTM, AAAS.

Dissertation:
1931 Two correspondences determined by the tangents to a rational cuspidal quartic with a line of symmetry. PhD dissertation, Catholic University of America, directed by Aubrey Edward Landry. Printed for The Catholic University of America, Washington, DC. Review: *JFM* 57.0826.05 (F. Schaale).

Abstracts not listed above:
1939 [Sister M. Felice] Diagonal functions. *Amer. Math. Monthly* 46:379 #1. Presented to the MAA, Milwaukee, WI, 6 May 1939.
1945 [Sister M. Felice] The Hagge circle of a point in the plane of a triangle. *Amer. Math. Monthly* 52:57 #1. Presented to the MAA, Milwaukee, WI, 13 May 1944.

Presentations not listed above:
[Sister M. Felice] Improving the testing program. Presented to the NCTM, Northfield, MN, 22 Aug 1951.
[Sister M. Felice] New emphasis in the calculus. Presented to the NCTM, Lincoln, NE, 31 Dec 1952.
[Sister M. Felice] Past and present trends in teaching the calculus. Presented to the NCTM, Seattle, WA, 24 Aug 1954.

References to: AmMSc 6–7; AmWom 1935–40.
"City's West Side Weather Report Is Recorded by Nun." *Milwaukee Journal*, 7 Feb 1954.

Other sources: PhD dissertation vita 1931; Owens questionnaires 1937, 1940; Owens Papers; Catholic University Archives; DePaul University Office of the Registrar; communications with Loyola University of Chicago Archives and with Mount Mary College Archives; US Census 1900, 1920, 1930 WI, 1920 IL.

Last modified: March 9, 2009.

VIVIAN, Roxana H. December 9, 1871–May 31, 1961.
Wellesley College (BA 1894), University of Pennsylvania (PhD 1901).

Roxana Hayward Vivian was the daughter of Roxana (Nott), born in 1848 in New Hampshire, and Robert Hayward Vivian, born in 1843 in Nova Scotia, Canada, a tailor. Her parents married in about 1870. She was born in Hyde Park (now part of Boston), Massachusetts, the eldest of three daughters, all born in Massachusetts. Her sisters were Anna G. (b. ca. 1874), a teacher in 1900, and Margaret W. (b. 1878).

Roxana Vivian attended public schools in Hyde Park. She gave the salutatory address at her graduation from the Grew School in 1886 and graduated from Hyde Park High School in 1890. She then enrolled at Wellesley College, where she majored in Greek and mathematics before graduating in 1894. She taught in the Stoughton, Massachusetts, public high school for the year 1894–95. Vivian held a secondary school teaching certificate and after the year of teaching took the examination for Boston High School Class A principal's certification. She then taught Greek and mathematics 1896–98 at the Walnut Hill School, a private boarding school in Natick, Massachusetts, while also pursuing graduate work in those subjects at Wellesley.

Vivian spent the years 1898–1901 as an alumnae fellow for women at the University of Pennsylvania in Philadelphia. She received her PhD in 1901 with a minor in astronomy, having been presented to the faculty of the university by the chairman of the mathematics department, Edwin Cawley. The method of presentation was new in 1901 and was described in an article in *Science*: the candidate "is presented by the professor under whom he has taken his major subject. The presentor reads a sketch of the candidate's academic life and an outline of the scope and contents of his thesis, after which any member of the faculty may make enquiries of the candidate or the presentor" (n.s. 14 (1901): 334). An example of the credentials of a candidate from each science was given, with those of Roxana Vivian representing mathematics.

After receiving her PhD, Vivian returned to Wellesley as instructor; she was the first member of the mathematics department to possess a doctorate. She made what was probably the first of many trips to Europe in summer 1902. In addition to her regular teaching assignments, Vivian was a reader for the College Entrance Examination Board in 1904.

Roxana Vivian was granted a leave of absence from Wellesley for the academic year 1906–07 to teach in Turkey at the American College for Girls (also known as Constantinople Woman's College). She continued her leave for 1907–09 to remain as acting president of the school while the president was in New York raising funds for the college. In 1908, while still in Turkey, Vivian was promoted to associate professor at Wellesley. She returned to Wellesley in 1909, having weathered a precarious time in Turkey because of the Young Turks Revolution in 1908. She described the situation in a "life history" she wrote in 1949 for the Wellesley College seventy-fifth anniversary. "Those three years ... were worth a great deal to me, teaching girls of thirteen nationalities and being in charge at a dangerous interval when I slept with my revolver and cartridge belt by my bedside, ready to take charge of four or five armed men, servants and night guards" (Wellesley College Archives).

Vivian spent a summer, most likely in 1912, at Cold Spring Harbor, New York, preparing to teach a course in statistics that had been suggested by a member of the economics department at Wellesley. In 1914 her first statistical article appeared. This article was coauthored with J. Arthur Harris, a botanist and biometrician at the Station for the Experimental Study of Evolution at Cold Spring Harbor.

In 1913–15 Vivian had a partial leave of absence from Wellesley and reduced her teaching load to a one-hour course while she worked as financial secretary of the Women's Educational and Industrial Union (WEIU), a non-profit social and educational agency that was concerned with training, placement, and legal protection for working women in Boston. In 1913–14 she gave an extension course in statistics for Boston University, and

in connection with her work with WEIU, she published another statistical article in 1916. Vivian continued her interest in statistics in social science and in 1924 published a book about the distribution of college students among the states.

In 1918 Vivian was promoted to professor and was appointed director of Wellesley's department of hygiene and physical education. She again had a leave from Wellesley's mathematics department and served as director until 1921, when she returned to the mathematics department. In the years 1922–25 she was chairman of the committee on investments for the Wellesley College Alumnae Association. During 1925–26 she visited Cornell University and attended classes in algebra, complex variables, differential equations, geometry, and probability and statistics. She left Wellesley in 1927. That summer Vivian made a lengthy trip that included a visit to Constantinople and countries around the Mediterranean.

Vivian spent the spring and summer of 1928 organizing and equipping the Eagle Wing School, a private college preparatory school for girls in Orleans, Massachusetts; her title there was principal. The school was unable to open because of financial circumstances. She then spent the year 1928–29 teaching mathematics in Oak Grove Seminary, a private school in Vassalboro, Maine. In 1929 she accepted the position of professor recently vacated by Mary Gertrude Haseman at Hartwick College in Oneonta, New York. Vivian also served in the newly created position of dean of women 1929–30; she resigned her professorship and left the college at the end of the first semester 1930–31. She was replaced in fall 1931 by Hazel Schoonmaker (Wilson). Vivian was next instructor and dean of girls at Rye Public High School, also in New York, 1931–35.

Vivian's reports to Wellesley over the years indicate that sometime after she left the college, she spent three or four winters in Chicago with her Wellesley freshman roommate, Ada Belfield, and several winters in Stamford, Connecticut. In a May 1940 letter to Helen B. Owens, Vivian wrote that "my life consists in visiting and in serving my invalid family members as I can — they are in Wellesley and South Natick. . . . With such a schedule as this you can see that I did not succeed in finding any professional opening after 1935" (Owens Papers). A later report to Wellesley notes that she motored across the country one summer in the early 1940s. In 1952, when she was eighty, she reported to Wellesley that she had spent two years in Greece and was then helping in an office of statistics at a Red Cross blood bank; she was also guiding visitors on Friday afternoons in Trinity Church, Boston. Vivian belonged to the Boston College Club and was an Episcopalian and a Republican.

Roxana H. Vivian died at age eighty-nine in 1961 at the Sophia Snow House of the Roxbury Home for Aged Women in the Roslindale neighborhood of Boston. She was buried in Newburyport, Massachusetts.

Organizational affiliations: AMS, MAA (charter member), Sigma Delta Epsilon, ACA (now AAUW), Phi Beta Kappa.

Dissertation:

1901 The poles of a right line with respect to a curve of order n. PhD dissertation, University of Pennsylvania. Printed by New Era Printing Co., Lancaster, PA. Abstract: *Science* n.s. 14:338.

Publications:

1914 with J. A. Harris. Variation and correlation in the mean age at marriage of men and women. *Amer. Naturalist* 48:635–37.

1916 An application of statistics to budget making for lunch rooms. *J. Home Econ.* 8:19–28.

1917a Mathematics: a great inheritance. *Educ. Rev.* 53:30-43. Presented to entering students at Wellesley College, Sep 1915.

1917b Review of *A History of Elementary Mathematics, with Hints on Methods of Teaching*, rev. and enlarged ed., by F. Cajori. *Amer. Math. Monthly* 24:385–87.

1919 Statistics in relation to the war. *Amer. Math. Monthly* 26:32–35. Review: *JFM* 47.0500.04 (G. Szegö).
1924 *A Brief Study of State Distribution of College Students*. Newton, MA: Graphic Press.

References to: AmMSc 3–8, 9P; BiDWSci; BioWMath; WomSc A; WomWWA.

Other sources: Owens questionnaire 1937; Owens Papers; Cornell University Archives; University of Pennsylvania Archives; Wellesley College Archives; communication with Hartwick College Archives; "Presentation before the faculty of candidates for the doctorate at the University of Pennsylvania," *Science* n.s. 14 (1901): 333–38; US Census 1880, 1900, 1910 MA, 1930 NY.

Last modified: March 9, 2009.

WEEKS, Dorothy W. May 3, 1893–June 4, 1990.
Wellesley College (BA 1916), Massachusetts Institute of Technology (MS 1923, PhD 1930), Simmons College (MS 1925).

Dorothy Walcott Weeks was born in Philadelphia, Pennsylvania, the second of three children of Mary (Walcott) (ca. 1869–1932) and Edward Mitchell Weeks (1866–1959) who married in 1889. Her mother was born in New York and graduated from the Girls' High and Normal School (now Philadelphia High School for Girls), a secondary school, in 1887. Her father was born in New Jersey and studied art in Philadelphia and at the Corcoran Art School in Washington, D.C. Later he was a law student at George Washington University, received an LLB in 1907, and practiced patent law for a time. Primarily, however, he worked as an engraver, first for private companies and then for the US Bureau of Printing and Engraving.

Her brother, Robert Walcott Weeks (1890–1964), was born in New York City and received a bachelor's degree in 1913 and a master's degree in 1914 from the Massachusetts Institute of Technology. Both Dorothy Walcott Weeks and her sister, Ruth Walcott Weeks (b. ca. 1897), fulfilled a longstanding dream of their parents that if they ever had a daughter she would go to Wellesley. Ruth Weeks, who was described as musical by her sister, graduated from Wellesley in 1919, three years after her older sister.

The Weeks family moved from Cheltenham, Pennsylvania, to Washington, D.C., in 1900. Dorothy Weeks attended public schools there and graduated from Western High School, where her freshman and sophomore mathematics teacher, Nannie J. McKnight, was a Wellesley graduate who had been in the same class as Helen Merrill. Weeks credited McKnight with stimulating her interest in science and mathematics and enrolled at Wellesley College with the intention of studying those subjects. She graduated in 1916 with a mathematics major, having taken all the courses in physics, mathematics, and chemistry that were offered, including three full-year mathematics courses from Helen Merrill and two full-year physics courses from Louise Sherwood McDowell, her mentor and later closest friend. While there she was also a member of the Shakespeare Society and continued her interest by attending meetings of the society when she lived in the Boston area in the 1920s. It was through the Shakespeare Society that Weeks had informal contact with many faculty members including Ellen Fitz Pendleton, president of the college and former member of the mathematics department, and Louise McDowell.

Until she graduated from college, Weeks had intended to teach high school mathematics. She wrote in her unpublished memoir "Fun on the Fringes": "I was shocked to hear that a classmate who had flunked Mathematics in college was to teach that subject in a high school! I realized then that this kind of position would not interest me. Financially it was out of the question for me to do graduate work. There were few assistantships and fellowships available at that time" (p. 501). She reported that women were then not being hired by the National Bureau of Standards so she decided to become an assistant examiner in the US Patent Office in Washington, D.C. There were six examinations to pass: mathematics, physics, chemistry, scientific French or German, mechanical drawing, and "technics." She later wrote that "before I passed these examinations and received an appointment to the U. S. Patent Office, I registered as a substitute teacher in the high schools of Washington.... The principal of Fairmount Seminary ... was in need of someone that fall of 1916 to teach most of the liberal arts courses" ("Fun on the Fringes," 503). She was hired to teach eight classes, six of which had only one or two students: chemistry, two algebra courses, plane geometry, beginning Latin, and Cicero and Horace. She also taught two classes of rhetoric with six and twelve students, one of whom was the actress Tallulah Bankhead. Weeks described her as "the most outstanding student I had, not necessarily academically" ("Fun on the Fringes," 504).

In spring 1917, still having trouble scoring high enough on the mechanical drawing and "technics" examinations, Weeks was a statistical clerk with the Office of Farm Management in the Department of Agriculture. She passed the patent office exams on her fourth try (the average number of attempts before passing was five) and in August 1917 joined one other woman among the four hundred examiners. She was the third woman to have been appointed a patent examiner, one having already retired. She also recalled that one did not have to wait as long as earlier since men were being drafted for World War I. She continued, "This is one thing that I've always resented, that my opportunities have come through wars, which is no way for women to get their opportunities" (Sopka interview, 6).

In order to qualify for a promotion, which she received, Weeks studied Substantive Patent Law at George Washington University for a year in the evenings. In March 1918 she applied to Cornell University to study physics and chemistry and was admitted. In July of that year she was admitted to candidacy for an MA degree with experimental physics as her major subject and theoretical physics as her minor subject. She studied at Cornell during the summers of 1918 and 1919. On October 13, 1919, Weeks wrote to the dean of the Graduate School at Cornell that she had "registered at George Washington University for an M.S. degree" in physics and wanted her work at Cornell to be counted. However, it appears that she never attended classes at George Washington. In 1920 she worked for the National Bureau of Standards, accepting a lower salary but attending classes given there by the physics faculty of the Johns Hopkins University. She returned to the Patent Office in June 1920.

During the summer of 1920, Edwin Wilson, the head of the physics department at MIT, wrote to the heads of physics departments at several women's colleges, including Louise McDowell at Wellesley, seeking to hire assistants. In September 1920 Weeks joined the instructional staff of the physics laboratory at the Massachusetts Institute of Technology as a laboratory assistant in the electrical laboratory; in 1922 she was made an instructor. She also studied while working at MIT and received her MS in experimental physics in June 1923. She chose the subject of her master's thesis because she was assisting Newell C. Page in his work with x-rays. After receiving her degree she taught college preparatory courses in physics part time at the Buckingham School in Cambridge, Massachusetts, while retaining her instructorship at MIT. In January 1923 Samuel Stratton became president of MIT. Stratton had been director of the National Bureau of Standards and only allowed women employees there when forced to during World War I. That spring Weeks began considering leaving MIT. In November 1923 she wrote to Cornell University to find out how much credit she could receive towards a PhD. She learned that no summer work would count toward residency and that her MIT work would not be evaluated until after she had registered; she did not return to Cornell. Instead, she attended the Prince School of Retailing at Simmons College 1924–25 while working at Filene's and became a supervisor for women at the Jordan Marsh department store in Boston in 1925 while still studying. She received a master's degree from Simmons in 1925. She became hiring supervisor at Jordan Marsh and remained in that position until September 1927. She then held a temporary position doing statistical work for a researcher at the Harvard Medical School.

In February 1928 Weeks returned to MIT for graduate work. She was also a three-quarter-time instructor of physics at Wellesley College 1928–29. During the summer of 1929 she taught mathematics at her alma mater, Western High School. Although she was offered a position teaching physics in a women's college in India, she decided to remain a student at MIT and in 1929–30 held a Horton-Hallowell fellowship given by the Wellesley alumnae association. Courses in theoretical physics, by then her real interest, were offered in the mathematics department. Her dissertation advisor was Norbert Weiner, but she also worked with D. J. Struik in connection with the matrices developed in her dissertation, which she described as both physical and mathematical. She received her PhD in 1930.

During the summer of 1930 she worked in Washington, D.C., as an expert technical advisor to the US Civil Service Commission.

After receiving her PhD, Weeks went to Wilson College, a women's college in Chambersburg, Pennsylvania, to develop the physics department and serve as the professor and head. It was only ninety miles from Washington, and early in her first years at Wilson she frequently drove home to see her family, especially the first two years when her mother was ill. The summer after her first year at Wilson she taught mathematics and chemistry at Central High School in Washington. She spent the summer of 1932 doing research in Cambridge, England. That summer she attended the International Congress of Mathematicians in Zurich and the International Federation of University Women convention in Edinburgh. She traveled to Europe with Louise McDowell in the summer of 1934 and returned to Cambridge for several weeks that summer. The following summer she returned to MIT and began a research program in atomic spectroscopy. She was not the only woman who was involved with spectroscopy. In fact, the abstract of Weeks's papers at MIT that appears in WorldCat notes that her papers "include material concerning the MIT 'Charm School', the women who gathered together during summer terms to work ... in the spectroscopy lab."

Weeks had become fascinated with spectroscopy several years earlier and thought it was a subject that could be understood by her undergraduate students at Wilson. She later explained that it was through Louise McDowell at Wellesley that she "became aware of the need for continuing growth of the faculty if students were to receive an enriched education. It was therefore necessary for [her] ... to continue research, in a field not only interesting to [her] but also readily understood by undergraduates" (**1974**, 32). Her research was supported by a grant from the American Academy of Arts and Sciences when she spent the first semester 1937–38 at MIT. Through 1950, except for the war years, she returned to work in MIT's spectroscopy laboratory during her vacations and while on sabbatical. This research led to a 1944 paper in the *Transactions of the American Philosophical Society.*

During World War II, Weeks first taught electricity and mechanics for an engineering science management war course at Wilson. From 1943 to 1945 she worked as a technical aide in the liaison office of the US Office of Scientific Research and Development (OSRD) supervising the British reports section. After the war she returned to Wilson College as professor of physics and head of the department but continued her position with the OSRD on a part-time basis through the end of 1946. She was a Guggenheim fellow at MIT and at laboratories in England and northern Europe 1949–50 and was a consultant to the National Science Foundation 1953–56. In 1954 she served as secretary, and then vice president, of the newly formed Central Pennsylvania Section of the American Association of Physics Teachers.

Weeks retired from Wilson in 1956 and moved to Wellesley to live with Louise McDowell (1876–1966), her former Wellesley physics teacher, mentor, and long-time friend. In Massachusetts Weeks began an eight-year association as a physicist with the Ordnance Materials Research Office of the Army Materials Research Agency at the Watertown Arsenal. She soon became their technical representative to the Committee on Radioactive Shielding. From 1956 to 1962 she coordinated a project that developed shielding material for use against nuclear weapons. In September 1964, two months after she was forced to retire from her position with the army, Weeks went to the Harvard College Observatory as a part-time spectroscopist as a member of the NASA-supported Solar Satellite Project. She stayed there twelve years, until her final retirement in 1976 at age eight-three. In 1966–71 she was also a physics lecturer at the Newton College of the Sacred Heart, where she worked to set up an undergraduate physics major.

Dorothy Weeks and Louise McDowell had traveled together over the years, and they purchased a summer cabin in the White Mountains in Randolph, New Hampshire, in 1946. Their last European trips together were to Paris in 1956 and to Helsinki in 1959. McDowell required full-time care from late 1960 until her death in 1966. In 1961 Weeks

bought McDowell's house in order to ensure that McDowell could remain there; Weeks subsequently bequeathed the house to Wellesley College.

In 1973 Weeks spoke at a panel, "Change and Continuity," when MIT commemorated a century of granting degrees to women. That year she also wrote her memoir "sitting at the table desk that was Miss [Helen] Merrill's" ("Fun on the Fringes," 405). It was deposited at the American Institute of Physics, Center for History of Physics.

Inspired by Ellen Fitz Pendleton, Weeks was active in the AAUW throughout her career and received its achievement award in 1969. She joined the Washington Branch in 1916, when it was still called the Association of Collegiate Alumnae (ACA), and was its treasurer 1918–20. Later she served as president of the Pennsylvania-Delaware Division 1938–40, as a member of the fellowship awards committee 1944–53, as chairman of the international grants committee 1946–53, as a member of the college faculty awards committee 1961–64 and 1965–66, and as president of the Boston Branch 1963–67. She was also active in the International Federation of University Women and was a member of the relief committee 1947–53 and the fellowship awards committee 1954–59. Just before retiring from Wilson College, she was president of the Central Pennsylvania Section of the American Association of Physics Teachers 1955–56, having previously been vice president. She was also a member of the board of corporators of the Woman's Medical College of Pennsylvania from 1946 to 1955 and was a member of the Washington Philosophical Society. She was the Wellesley College reunion chairman several times before World War II and then again for her fiftieth and fifty-fifth reunions. In 1973 she wrote, "Now I have been appointed reunion chairman for life" ("Fun on the Fringes," 1508).

Weeks received honorary degrees from Regis College, MIT, and the Medical College of Philadelphia. She was one of forty-five graduates to be interviewed on their college experience for a Wellesley centennial publication, *Wellesley After-Images*. On May 12, 1980, she was interviewed for the Wellesley Oral History Project, which retains a tape recording of that interview. Wellesley's alumnae association gave her its alumnae achievement award in 1983 to recognize "her career as teacher, physicist and leader in women's education" (Hartmann, "There are Diversity of Gifts").

In a letter written in October 1986 that appeared the following June under the heading "Women in physics," Weeks replied to a series of letters on that topic. She described herself as "a retired woman physicist who this past May had her 93rd birthday. I retired when I was 83. I have just attended my 70th class reunion at Wellesley College." She described her career and noted that "the responsibilities assigned me were independent of sex. Education, ability and personality are the important factors that should be considered when a person is appointed to a position" (*Physics Today* 40 (6): 15).

Dorothy W. Weeks had been living in Wellesley before she died, following a stroke, at the Newton-Wellesley Hospital in Newton, Massachusetts, at age ninety-seven in 1990. She was survived by her sister. A memorial service was held at St. Andrew's Episcopal Church in Wellesley.

Organizational affiliations: AMS, Amer. Assoc. of Phys. Teachers, Amer. Phys. Soc., Optical Soc. of Amer., AAAS, AAUW, Internat. Federation of Univ. Women, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1923 The determination of the crystalline structure of some metals and oxides by x-rays. MS thesis (physics), Massachusetts Institute of Technology, directed by Newell Caldwell Page.

1930 A study of the interference of polarized light by the method of coherency matrices. PhD dissertation, Massachusetts Institute of Technology, directed by Norbert Wiener. See also **1934a** and **1934b**.

Publications:

1934a Three mathematical methods of analyzing polarized light. *J. Math. Physics* 13:371–79. Part one of published version of PhD dissertation. Reviews: *JFM* 60.0755.03 (J. Picht); *Zbl* 011.18902 (J. Picht). Presented as "A study of the interference of polarized light by the method of coherency matrices" to the AMS, Providence, RI, 12 Sep 1930; abstract: *Bull. Amer. Math. Soc.* 36:642 #365.
1934b A study of sixteen coherency matrices. *J. Math. Physics* 13:380–86. Part two of published version of PhD dissertation. Reviews: *JFM* 60.0756.01 (J. Picht); *Zbl* 011.18903 (J. Picht). Presented as noted in **1934a** above.
1944 An analysis of the Zeeman patterns of the spectrum of Fe 1. *Trans. Amer. Philos. Soc.* n.s. 34, pt. 2: 181–206. Part 2 of monograph "The arc spectrum of iron (Fe 1)" by H. N. Russell, C. E. Moore, and D. W. Weeks, *Trans. Amer. Philos. Soc.* n.s. 34, pt. 2: 113–206. Review of monograph: *J. Roy. Astron. Soc. Canada* 39:320–21 (F. S. Hogg).
1946 with L. Pearce. The problem of atomic energy. *J. Amer. Assoc. Univ. Women* 39:81–82.
1951 After our international students return home. *J. Amer. Assoc. Univ. Women* 44:89–90.
1955 Woman power shortage in the physical sciences. *J. Amer. Assoc. Univ. Women* 48:146–49.
1960 Women in physics today. *Phys. Today* 13 (8): 22–23.
1962 Editorial: The Land-Grant colleges. *J. Amer. Assoc. Univ. Women* 55:109.
1971 Women – who extend scientific knowledge. *Wellesley Alum. Mag.* 55 (Summer): 1–2.
1974 The best possible education. In *Wellesley After-Images: Reflections on their College Years by Forty-Five Alumnae*, 31–33. Los Angeles: Wellesley Club of Los Angeles, 1974.
1975 with H. B. Creighton. The early years in the sciences: pioneer professors. *Wellesley Alum. Mag.* (Winter) 59:28–29.

Technical report:
1967 with E. A. Simpson. *Absorption Spectrum of Iron in the Vacuum Ultraviolet 2950–1588 A.* Harvard College Observatory Scientific Report no. 19. Cambridge, Mass.: Harvard College Observatory.

Abstracts not listed above:
1938 with G. R. Harrison. New survey of the spectrum of the international iron arc in the range 10,000 to 200A. *Phys. Rev.* 54:312 #4. Presented to a meeting of the Amer. Phys. Soc., Toronto, ON, Canada, 24–25 Jun 1938.
1953 What can the small college do in the way of a modest research program in physics? *Amer. J. Phys.* 22:149 #2. Presented to a meeting of the Amer. Assoc. Phys. Teachers, Lewisburg, PA, 23–24 Oct 1953.
1965 Absorption spectrum of Fe I in the vacuum ultraviolet. *Astron. J.* 70:696. Presented to a meeting of the Amer. Astron. Soc., Ann Arbor, MI, 3–6 Aug 1965.

References to: AmMSc 5–8, 9P–11P; AmMWSc 12P–13P, 14–18; AmWomTe; BiDWSci; DcWomW; OutEdAm 1970; WhoAmW 1–6; WomFir.
"Dorothy W. Weeks – 1969 Achievement Awardee," *AAUW Journal* 63 (1970): 89.
"Dorothy Weeks, 97, A Physicist Who Led in Variety of Careers." (Obituary) *New York Times*, 8 Jun 1990.
"Dorothy Weeks, Was Physicist, Educator and Researcher; at 97." (Obituary) *Boston Globe*, 9 Jun 1990.
Hartmann, Shannon W. "There Are Diversities of Gifts, But the Same Spirit. . . " *Wellesley Magazine*, Winter 1991, inside back cover.

Related manuscript materials:
Weeks, Dorothy Walcott. Papers, 1940–1980, MIT Archives and Special Collections.

Response to 1988 History of Nuclear Physics Survey (bound, unpublished memoir entitled "Fun on the Fringes"). American Institute of Physics, Center for History of Physics. College Park, Maryland.

Unpublished interviews:
Weeks, Dorothy Walcott, 1893–1990. Interview by Katherine Russell Sopka, 19 Jul 1978. American Institute of Physics, Center for History of Physics, College Park, MD. Transcript. Dorothy Weeks. Interview by Barbara Viechnicki, 12 May 1980, 28 Dover Rd., Wellesley, MA. Wellesley Oral History Project, Wellesley Historical Society.

Other sources: PhD dissertation vita 1930; Division of Rare and Manuscript Collections, Cornell University Library; NCAB 46 (Weeks, Edward Mitchell); US Census 1910, 1930 DC, 1930 MA.

Last modified: August 4, 2009.

WEISS, Marie J. September 21, 1903–August 19, 1952.
Stanford University (BA 1925, PhD 1928), Radcliffe College (MA 1926).

Marie Johanna Weiss was born in Eugene, California, the youngest of three surviving children of Alice Hedwig (Buschke) and Frederick Weiss. Both parents were born in Germany, her mother in 1880 and her father in 1869; they immigrated to the United States in 1894 and 1884, respectively. At the turn of the century, they had been married three years, had a one-year-old daughter, and were living in Stanislaus County, California, where Frederick Weiss raised stock. By 1910 the family, with children Hedwig age eleven, Karl age nine, and Marie, owned their own farm and were living in Stockton, where they remained throughout Marie's university years.

Marie J. Weiss attended public grammar and high schools in Stockton, California, before going to Stanford University in the fall of 1921. While there she was a member of Roble Club, which was the women's dormitory; the German Club, of which she was vice president for two years; the Women's Education Club, of which she was secretary-treasurer her senior year; and the Zoology Club. In the summer of 1924, after her junior year, she served as an assistant in instruction in mathematics. She was elected to Phi Beta Kappa and graduated with great distinction in mathematics in 1925, one of eleven receiving BA's in mathematics at Stanford that year, eight of whom were women.

The following academic year Weiss studied at Radcliffe College, where she earned her master's degree, before returning to Stanford as a graduate student and university fellow in mathematics during the two years 1926–28. She was again an assistant in instruction and taught theory of functions in the summer of 1927. Her dissertation in group theory, directed by W. A. Manning, is dated August 1927. She received her PhD in June 1928. A published version of her dissertation appeared in 1928 and was mentioned in E. T. Bell's 1938 survey, "Fifty years of algebra in America, 1888–1938." It was one of very few papers chosen to "indicate the continued activity of men already in the field in 1907, the enlisting of new recruits, and the general nature of the problems considered" by those working in group theory (p. 13). Weiss was appointed to a National Research Council fellowship in mathematics for 1928–29 and was reappointed for the following year; she spent both years studying at the University of Chicago.

In 1930 the mathematics department at H. Sophie Newcomb College, Tulane University, underwent significant changes: Marie J. Weiss joined the faculty as assistant professor, Nola Anderson (Haynes) joined the department as associate professor and chair, and Anna M. Howe left Newcomb after eleven years as assistant professor. Weiss remained at Newcomb as assistant professor until 1936, except for 1934–35, when she was on leave to spend the year at Bryn Mawr College as Emmy Noether scholar and resident scholar in mathematics. Weiss was one of four graduate students and post-graduates (the others were Ruth Stauffer (McKee), Grace Shover (Quinn), and Olga Taussky) invited to study with Emmy Noether in her second year at Bryn Mawr and what turned out to be the last year of Noether's life. It was during this year that Weiss began work on a problem on units in fields that resulted in her 1936 paper.

Weiss returned to Newcomb College for the year 1935–36 but left in 1936 to take an assistant professorship at Vassar College. After two years at Vassar she returned to Newcomb as professor and chair when, in 1938, Nola Anderson left the Newcomb department to marry. Weiss remained in those positions the rest of her career there. She turned her attention to preparing a highly successful text and to participating in many professional activities in addition to administering the department and teaching at Newcomb. She was particularly active as a member of the MAA. She attended annual meetings regularly after receiving her PhD and was a member of the board of trustees 1937–38. She refereed papers for the *Monthly* from at least 1939 until 1946 and was associate editor 1940–46. In that role she was also editor of the Discussion and Notes section 1943–46. She was a member of the

Committee to Review Activities of the MAA 1938–40; was a member of the Conference Committee on Education 1941–44; and was governor-at-large 1950–52. Although not as active in the governance of the AMS, she presented six papers at meetings 1927–36, was appointed to the nominating committee in 1939, and gave a brief dinner talk at a meeting in Chicago the following year. Weiss was also active at the national level in AAUP, serving on the council 1940–42 and as second vice president 1948–50.

In an undated interview in her file in the Tulane archives, Weiss remarked on mathematics as a field for women. She noted that in the previous year eight women had received doctorates in mathematics in the US and Canada. She said, "Mathematics is an open field for women but few of the top positions–either in teaching or research–are held by women. . . . For the woman who desires a chance for a top position in either teaching or research, the doctorate is a union card. And top positions in either teaching or research form what is essentially a 'closed shop.' "

Beginning in about February 1952 Marie Weiss became increasingly ill. While visiting her widowed mother and her brother in Visalia, California, in the summer of 1952 the illness worsened, and, after six days in the Langley Porter Clinic in San Francisco, Marie Weiss died, at age forty-eight, of congestive heart failure as a result of bacterial endocarditis. Weiss had been a Lutheran and is buried in Stockton, California. The Marie J. Weiss Memorial Scholarship Fund was established at Newcomb College in 1952.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, AAUW, AAUP, Phi Beta Kappa, Sigma Xi.

Dissertation:

1927 Primitive groups which contain substitutions of prime order p and of degree $6p$ or $7p$. PhD dissertation, Stanford University, directed by William Albert Manning. Summary: *Stanford University, Abstracts of dissertations for the degrees of doctor of philosophy and doctor of education, with the titles of theses accepted for the degrees of engineer, master of arts, and master of science* 3: 117–19. See also **1928**.

Publications:

1928 Primitive groups which contain substitutions of prime order p and of degree $6p$ or $7p$. *Trans. Amer. Math. Soc.* 30:333–59. Published version of PhD dissertation. Reviews: *JFM* 54.0144.02 (R. Baer); *Rev. semestr. publ. math.* 34, pt. 1: 44 (P. Mulder). Presented to the AMS, Berkeley, CA, 29 Oct 1927; abstract: *Bull. Amer. Math. Soc.* 34:18 #12.

1929 On groups defined by $A^q = 1$, $B^{-1}AB = A^x$, $B^Q = A^e$. *Proc. Nat. Acad. Sci. USA* 15:903–5. Review: *JFM* 55.0675.01 (E. Pannwitz). Presented to the AMS, Des Moines, IA, 30 Dec 1929; abstract: *Bull. Amer. Math. Soc.* 36:203 #137.

1930 The limit of transitivity of a substitution group. *Trans. Amer. Math. Soc.* 32:262–83. Review: *JFM* 56.0133.01 (L. Buchhorn). Presented to the AMS, Boulder, CO, 29 Aug 1929; abstract: *Bull. Amer. Math. Soc.* 35:767 #34.

1931 Review of *Elementary Theory of Finite Groups*, by L. C. Mathewson. *Amer. Math. Monthly* 38:279–80.

1934 On simply transitive primitive groups. *Bull. Amer. Math. Soc.* 40:401–405. Reviews: *JFM* 60.0086.04 (W. Specht); *Zbl* 009.30003 (W. Magnus). Presented to the AMS, Cambridge, MA, 27 Dec 1933; abstract: *Bull. Amer. Math. Soc.* 40:52 #81.

1936 Fundamental systems of units in normal fields. *Amer. J. Math.* 58:249–54. Reviews: *JFM* 62.0164.03 (H. Reichardt); *Zbl* 014.00602 (C. C. MacDuffee). Presented by title to the AMS, St. Louis, MO, 2 Jan 1936; abstract: *Bull. Amer. Math. Soc.* 42 (1, pt. 2): 36 #53.

1939 Algebra for the undergraduate. *Amer. Math. Monthly* 46:635–42. Presented to the MAA, Madison, WI, 4 Sep 1939; paper #1.

1940 Genius and youth in mathematics. *Sigma Delta Epsilon Newsl.* Presented to Sigma Delta Epsilon, Columbus, OH, 28 Dec 1939.

1943 Review of *Calculus*, by A. L. Newlson, K. W. Folley, and W. M. Borgman. *Amer. Math. Monthly* 50:195–96.
1944 Review of *Mathematical Recreations*, by M. Kraitchik. *Amer. Math. Monthly* 51:42–43.
1949 *Higher Algebra for the Undergraduate*. New York: John Wiley and Sons. Reviews: *Amer. Math. Monthly* 57:642–43 (R. M. Thrall); *Math. Gaz.* 34:230–31 (D. E. Littlewood). Second ed.: 1962. Rev. by Roy Dubisch. New York: John Wiley and Sons. Review: *Zbl* 102.25201 (K. Latt).

Abstract not listed above:
1931 The degree of simply transitive primitive substitution groups of class u. *Bull. Amer. Math. Soc.* 37:24 #46. Presented to the AMS, Cleveland, OH, 30 Dec 1930.

References to: AmMSc 5–8, AmWom 1935–40, BiDWSci.
"Noted Educator Taken by Death," *Times-Picayune*, 26 Aug 1952.
"Dr. Weiss Dies in California," *Tulanian*, Oct 1952.

Other sources: Owens questionnaires 1937, 1940; Stanford University Archives; Tulane University Archives; Bell "Fifty Years of Algebra in America"; US Census 1900, 1910, 1920, 1930 CA.

Last modified: July 20, 2009.

WELLS, Mary Evelyn. August 20, 1881–October 7, 1965.
Mount Holyoke College (BA 1904), University of Chicago (MS 1907, PhD 1915).

Mary Evelyn Wells was born in LeRaysville, Pennsylvania, the second of three children of Delphine (Whitford) (b. 1854) and William Henry Wells (b. 1851). Her older brother, George E., was born in May 1879; her younger sister, Anna M., was born in May 1885. Her parents and siblings were born in Pennsylvania, where her father was listed as a farmer in the 1880 census. In 1900 her parents had been married twenty-five years, and the family was living in Naugatuck, Connecticut, where her father was a carpenter. In 1910 her mother was widowed, living with her other daughter and son-in-law in Naugatuck, and working at home as a dressmaker.

Mary Wells received most of her elementary education at home and in the public schools of Brushville and LeRaysville, Pennsylvania. She attended a little over a year of grammar school and four years of high school in Naugatuck and graduated from the academic course in the Naugatuck high school in 1900. That fall she entered Mount Holyoke College, from which she graduated four years later as a mathematics major. She stayed at Mount Holyoke as a department tutor in mathematics for a year after her graduation. She was later elected a Mount Holyoke alumna member of Phi Beta Kappa.

In the fall of 1905, Wells entered the University of Chicago, where she studied for three quarters in each of the years 1905–06 and 1906–07. She was a fellow the second year and received her master's degree in 1907. She became an instructor at Mount Holyoke College that fall and taught there for five years before returning to the University of Chicago as a graduate student in 1912. She stayed at Chicago two years, with a fellowship from Mount Holyoke 1912–13 and a fellowship from Chicago 1913–14 during which she taught one quarter. While at Chicago for her master's and doctoral degrees, she studied under E. H. Moore, H. Maschke, L. E. Dickson, H. E. Slaught, A. C. Lunn, and E. J. Wilczynski in mathematics and under F. R. Moulton and W. D. MacMillan in astronomy. Her dissertation was supervised by E. H. Moore, and the PhD degree was awarded in 1915. Wells had also served as a reader in mathematics for the College Entrance Examination Board in New York City from 1908 to 1913.

During 1914–15 Mary Evelyn Wells was an acting associate professor at Oberlin College, as a temporary replacement for Mary Sinclair, who was away for her first sabbatical. In the fall of 1915, Wells joined the faculty at Vassar College, where she remained except for leaves until her retirement in 1948. She was instructor 1915–20, assistant professor 1920–22, associate professor 1922–28, professor 1928–48, and emeritus professor after 1948. From 1936 to 1948 she was chairman of the department. According to Benjamin Lotto at Vassar, her teaching included a secret course in cryptography for the navy during World War II; the course was taught from about 1943 until the end of the war and had been requested by the navy in order to train women with mathematical and language skills.

Wells traveled abroad in the summers of 1922 and 1924, with records showing her returning to New York by ship from Southampton and Hamburg, respectively. She then had a leave of absence from Vassar from 1926 to 1928. During the first year, 1926–27, she was an exchange professor and head of the department at Women's Christian College, University of Madras, India. The next year, 1927–28, she studied at the Istituto Fisico of the University of Rome, where Vito Volterra was professor. She had corresponded with him in 1925, before she left for India, and in 1928 she published a translation into English of Volterra's 1926 paper that describes his famous theory on population growth. This paper appeared in a journal published in Denmark by the Conseil international pour l'exploration de la mer. Four letters Wells wrote to Volterra are in the archives of the Accademia Nazionale dei Lincei.

According to her faculty file at Vassar, Wells translated other works, most notably Bernhard Riemann's "On the hypotheses which lie at the foundations of geometry," which appeared in *A Source Book in Mathematics* by David Eugene Smith (New York: McGraw-Hill, 1929; reissued New York: Dover Publications, 1959). That translation is credited to H. S. White, and a note in her faculty file indicates that "Miss Wells said her name was omitted by mistake."

During 1936–37, Wells had a leave of absence from Vassar and returned to Women's Christian College, University of Madras. She served as a trustee of the University of Madras from 1930 to 1937 and again after 1948. She was also a director of St. Christopher's College in Madras 1928–37, of Women's Christian College in Madras 1927–37 and after 1948, and of Women's Christian College in Tokyo 1930–37. In May 1940 she wrote to Helen Owens that she had "published in India and Denmark" (Owens Papers). The latter publication presumably refers to her 1928 translation of Volterra, but her Indian publication remains a mystery.

Wells joined the AMS in 1908, about a year after she received her master's degree, and from that time until 1942, except when abroad, she normally attended several meetings a year of the society. In about 1940 she described herself as an Episcopalian whose favorite recreations were skating and climbing. Other favorite leisure activities were reading, walking, and gardening. Under religious activities, she mentioned that she was on a community church board for several years.

For many years Wells maintained a home in Southport, Maine, where she spent some summers. In 1957 Wells was living in Naugatuck, where her widowed sister, Anna, a former teacher, made her home. Wells described her main avocation as work for the Women's Christian College in Madras. In November 1958 she moved from Naugatuck to Wethersfield, Connecticut. It appears that she was living in Vermont by about 1959. At various times she used addresses in Rutland and nearby Pittsford, near her nephew.

Mary Evelyn Wells died at age eighty-four in 1965 at a nursing home in Rutland, Vermont, after a long illness and was cremated in Troy, New York. She was survived by her nephew in Pittsford, several grandnephews, and a grandniece. The Mary E. Wells and Gertrude Smith Fund, honoring Wells and another long-time mathematics faculty member, was established at Vassar for students demonstrating excellence in mathematics.

Organizational affiliations: AMS, MAA (charter member), AAAS (fellow), AAUP, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1907 Concerning the motion of a homogeneous rigid bar under the attraction of a non-homogeneous sphere. MS thesis, University of Chicago. Typescript.

1915 On inequalities of certain types in general linear integral equation theory. PhD dissertation, University of Chicago, directed by Eliakim Hastings Moore. Private edition, 1917, distributed by the University of Chicago Libraries, reprinted from *Amer. J. Math.* 39:163–84.

Publications:

1917 On inequalities of certain types in general linear integral equation theory. *Amer. J. Math.* 39:163–84. Published version of PhD dissertation. Review: *JFM* 46.0653.06 (O. Toeplitz).

1918a Review of *A First Course in Higher Algebra*, by H. Merrill and C. E. Smith. *Amer. Math. Monthly* 25:72–74.

1918b Review of *Plane Trigonometry with Tables*, by E. H. Barker. *Bull. Amer. Math. Soc.* 24:491–93.

1928 (Translator from the Italian) Variations and fluctuations of the number of individuals in animal species living together, by Vito Volterra. *J. du Conseil* 3:3–51. Reprinted as an appendix to *Animal Ecology: With Especial Reference to Insects* by R. N. Chapman, 409–48. New York: McGraw-Hill Book Co., 1931.

1929 Review of *Short Course in Spherical Trigonometry*, by P. Sperry. *Amer. Math. Monthly* 36:394–95.
1933a Review of *Mathematical Excursions*, by H. A. Merrill. *Amer. Math. Monthly* 40:602–03.
1933b Review of *Totarum: The Story of a Village Boy in India Today*, by I. M. Bose. *Vassar Quarterly* November 1933, 393–94.
1934a Review of *Brief Course in Plane and Spherical Trigonometry*, by H. A. Davis and L. A. Chambers. *Amer. Math. Monthly* 41:98–99.
1934b Review of *The Geometry of Repeating Design and Geometry of Design for High Schools*, by A. D. Bradley. *Amer. Math. Monthly* 41:99–100.
1937 Review of *Lectures on College Algebra*, by S. B. Dandekar. *Amer. Math. Monthly* 44:649–50.
1938 Review of *Plane Trigonometry*, by J. B. Rosenbach, E. A. Whitman, and D. Moskovitz and *Plane and Spherical Trigonometry*, by J. B. Rosenbach, E. A. Whitman, and D. Moskovitz. *Amer. Math. Monthly* 45:182.
1943a Henry Seely White, 1861–1943. *Science* 98 (2534): 76–77.
1943b Henry Seely White–In Memoriam. *Bull. Amer. Math. Soc.* 49:670–71.

Reference to: AmMSc 4–8, 9P–10P; AmWom 1935–40; WhAm 6.
"Naugatuck Woman Ends Trip Abroad." Unidentified newspaper clipping.
"Dr. Mary E. Wells, 84." (Obituary) *New York Post*, 8 Oct 1965.
"Dr. Mary Wells, Retired Professor." (Obituary) *Poughkeepsie (NY) Journal*, 8 Oct 1965.
"Dr. Mary E. Wells." (Obituary) *New York Times*, 11 Oct 1965.

Other sources: Master's thesis vita 1907; PhD dissertation vita 1917; Owens Papers; Mount Holyoke College Archives; Vassar College Archives; communication with Vassar College Archives; "Cryptography Course Concealed!", in Enlisting Women, *Vassar, the Alumnae/i Quarterly* (Winter 2002); US Census 1880 PA, 1900, 1910, 1920 CT, 1930 NY.

Last modified: January 16, 2016.

WHEELER, Anna (Johnson) Pell. May 5, 1883–March 26, 1966.
University of South Dakota (BA 1903), University of Iowa (MA 1904), Radcliffe College (MA 1905), University of Chicago (PhD 1910).

Anna Johnson was born in Calliope (now Hawarden), Iowa, the youngest of three surviving children of four born to Amelia (Friberg or Frieberg) (1854–1935) and Andrew Gustav Johnson (1846–1920), both from Skaraborglän, Wästergötland, Sweden. Her parents had each immigrated to the United States in 1872, married several years after their arrival, and settled in Union Creek in Dakota Territory. Her father first farmed but later was a furniture dealer and undertaker. Her sister, Esther Carolina (1879–1979), and her brother, Elmer (b. 1881), were both born in Dakota Territory. In 1882 the family moved to Iowa, first Calliope and then, in about 1891, to nearby Akron. Anna Johnson attended public school in Akron and graduated from high school there in 1899. According to Esther Johnson's granddaughter Nancy J. Owens, who spoke at an AWM-sponsored symposium in honor of her great aunt, Amelia Johnson regretted not having received an education and sent her two daughters, but not her son, to college.

In 1899 Anna Johnson entered the University of South Dakota in Vermillion, about twenty-five miles from Akron; her sister, Esther, had entered the previous year. Anna first took courses that allowed her to complete the formal entrance requirements of the school. When the census was taken in early June 1900, she was enumerated as a boarder in Vermillion and with her family in Akron, where her father was a furniture dealer, her sister was a school teacher, and her brother was a day laborer.

Anna Johnson continued her studies at South Dakota, where her mathematical talent was recognized by Alexander Pell, who "found his prodigy" after seeing her approach to an original geometry problem he had assigned (Hardesty and Unruh, "The Enigma of Degaev-Pell," 17). Pell and his wife, Emma, took several students, among them Anna and Esther Johnson, into their home to live.

With Pell's strong encouragement, Johnson graduated from South Dakota in 1903 and went to the University of Iowa on a scholarship. She received her master's degree in 1904 and then went to Radcliffe College with a scholarship. She received her second master's degree in 1905. Still on scholarship she stayed at Radcliffe until 1906, when she went to the university in Göttingen on an Alice Freeman Palmer fellowship from Wellesley College. On July 9, 1907, she married Alexander Pell in Göttingen. Pell's first wife had died in December 1904, and he and Johnson had remained in contact over the years.

Pell was born Sergei Petrovich Degaev in 1857 in Moscow, Russia. After attending military schools Degaev received an army commission in 1876. He retired from the service in 1879 and entered engineering school in St. Petersburg. Toward the end of 1880 he joined the People's Will, a group that was responsible for the assassination of Tsar Alexander II in March 1881. Degaev was among those arrested but was released a few weeks later. He graduated in June and married Liubov Nikolavena Ivanova in November 1881. His subsequent activities in, and escape from, Tsarist Russian were described in a 1972 article, "The Enigma of Degaev-Pell," and were more fully depicted in a 2003 monograph, *The Degaev Affair*. In November 1882 Degaev was sent to Odessa by the People's Will to set up a printing press and was soon arrested there. He contacted the head of the secret police, Georgii Sudeikin, hoping, according to his sister, "to achieve revolutionary goals through the government" (Pipes, *The Degaev Affiar*, 67); he became a collaborator and was allowed to escape. However, upon the arrest of many members of the People's Will, Degaev confessed his collaboration to this group, promised to assassinate Sudeikin, and did so in December 1883. After the assassination Degaev was expelled from the People's Will but was offered money to travel to America. Furthermore, in February 1884 the Russian authorities circulated a poster with his picture and offered a significant reward.

Degaev and his wife fled to England and then came to North America. This part of his life was described in a 1921 obituary by Charlotte Scott:

> His early history is that of so many of his compatriots in that sorely disturbed country, driven into futile revolutionary courses by his patriotism and forced by failure to leave his native land. . . . Apparently he went from place to place, doing whatever he could find to do; one of his earliest jobs was in a printing office in a small Canadian village. These early struggles must have occupied a few years before he went to St. Louis, where he secured a position in a chemical factory in 1886. ("Dr. Alexander Pell," *Bryn Mawr College News*, 9 Feb 1921, 2)

In 1891 Degaev and his wife, using the names Alexander and Emma Pell, became US citizens, and Alexander Pell began his study of mathematics at Washington University in St. Louis under the direction of C. M. Woodward. He began graduate studies at Johns Hopkins University in 1895 and was awarded his PhD in 1897. He was appointed professor at South Dakota that year and not long afterwards had Anna Johnson as a pupil. Thus, despite "his constant fear of revolutionary retribution" (Pipes, 119), Pell traveled to Göttingen in the summer of 1907 in order to marry his protégé. Both Alexander and Anna Pell returned to the United States in August.

The year 1907 also marked the opening of the University of South Dakota's School of Engineering and the appointment of Pell as its first dean. Anna J. Pell taught at South Dakota during the fall semester of 1907 and returned alone to Göttingen in the spring of 1908. In August 1908, Alexander Pell, who had been starred in the 1906 edition of *American Men of Science*, resigned from his position as dean of the College of Engineering at South Dakota and took a position as an assistant professor at the Armour Institute of Technology (now Illinois Institute of Technology) in Chicago. In December 1908, when she was almost ready to take her final examination with David Hilbert in Göttingen, Anna J. Pell returned to the United States without her degree and in January 1909 enrolled at the University of Chicago.

Anna J. Pell received her PhD magna cum laude in 1910 from the University of Chicago. While she was officially a student of E. H. Moore, she wrote at the time that her dissertation, in the new field of functional analysis, had been written independently while in Göttingen. Moore was unable to secure Anna Pell a position at a research institution, so she remained in Chicago and taught a class at the university during the fall. In January 1911, Alexander Pell, by then an associate professor at the Armour Institute, suffered a stroke while teaching. Anna J. Pell substituted for her husband for the remainder of the semester. His only teaching after the stroke was for a semester at Northwestern University in 1915–16.

In the fall of 1911 Anna Pell became an instructor at Mount Holyoke College in Massachusetts. In 1914 she was promoted to associate professor. Four years later she moved to Bryn Mawr College as associate professor to fill the vacancy created when Olive C. Hazlett went to Mount Holyoke College. Bryn Mawr, whose mathematics department was headed by Charlotte A. Scott, had a more active department than Mount Holyoke and also had a PhD program. The department's journal club met regularly, and Anna Pell was an active participant, often giving both the first and last talks of the semester.

Early in 1921 Alexander Pell died. That same year the third edition of *American Men of Science* appeared with Anna J. Pell starred. The following year, Anna Pell's first PhD student, Margaret Buchanan (Cole), earned her degree. In 1923 Pell was appointed to the American Mathematical Society's committee on policy and budget. Later that year the AMS was incorporated and she was appointed to the original board of trustees, which consisted of thirty-one members; Anna J. Pell and Clara E. Smith of Wellesley College were the only women on the board. While neither Pell nor Smith was elected in 1924 to the smaller five-member board of trustees, Pell was elected to serve on the council of the

AMS for 1924–26. Also, in 1923 Pell became the first woman to deliver an invited address at a meeting of the AMS; the next was delivered by Emmy Noether in 1934.

Pell became head of the department after Charlotte Scott's retirement in 1924. She was named Alumnae Professor of Mathematics the following year. In July 1925 she married Arthur Leslie Wheeler (1861–1932), a Connecticut-born, Yale-educated classicist who had been on the faculty at Bryn Mawr since 1900 and who was widowed before Pell joined the Bryn Mawr faculty. Before their marriage, Arthur Wheeler had accepted a professorship at Princeton University. Their marriage was announced in the *Bulletin* of the AMS, which notes, "they will continue to occupy their professorships and they will be at home after this fall in Princeton and in Bryn Mawr" (31 (1925): 573). Shortly before her marriage to Wheeler, Anna Pell made a contribution in honor of Alexander Pell to the society's endowment fund.

In 1927 D. V. Widder, an associate on the Bryn Mawr mathematics faculty, was promoted to associate professor, thus allowing Anna Pell Wheeler to become a non-resident lecturer, teach only part time, and live full time in Princeton, New Jersey. She continued this arrangement for the next four years except for a year spent in Europe. While still living in Princeton, she returned to her professorship in 1931 when Widder, who later married one of Wheeler's doctoral students, left for a position at Harvard. The following year Arthur Wheeler died and Anna Pell Wheeler moved back to Bryn Mawr, Pennsylvania.

While she was married to Arthur Wheeler, Anna Pell Wheeler was particularly active in both the AMS and the MAA. In addition to finishing her term on the AMS council, in 1926 she served on the first MAA Chauvenet Prize committee and the following year began a fifteen-year appointment as an associate editor of the *Annals of Mathematics* representing the MAA. She directed three dissertations while she lived in Princeton (Marion Cameron Gray 1926, Laura Guggenbühl 1927, and Rose Lucile Anderson 1930). In 1927 Wheeler became the first woman to deliver the AMS colloquium lectures; the next by a woman were delivered in 1980 by Julia Robinson. Wheeler's lectures do not appear in the Colloquium Publication Series although after Arthur Wheeler's death she apparently planned to rewrite them in book form. After his death in 1932, Anna Pell Wheeler published only one more paper, that in 1935.

After Wheeler's return to full-time teaching, Bryn Mawr joined the University of Pennsylvania and Swarthmore College in a cooperative plan for graduate study. Wheeler hired strong research faculty during the 1930s. Gustav A. Hedlund was at Bryn Mawr from 1930 to 1939; Emmy Noether joined the Bryn Mawr faculty in 1933, became a close friend of Wheeler, and remained until her death in April 1935; Nathan Jacobson stayed only 1935–36; and Hilda Geiringer came in 1939 and stayed until 1944, leaving soon after marrying Richard von Mises of Harvard. During this period Wheeler supervised four more dissertations (Olive Margaret Hughes 1934, Vera Ames (Widder) 1938, Dorothy Maharam (Stone) 1940, and Josephine Mitchell (1942). She also served on the College Entrance Examination Board Commission on Examinations in Mathematics that was appointed in 1933 and reported early in 1935. Later she served several terms on the AMS committee to determine the use of interest accrued from special funds and was chairman of the Philadelphia Section of the MAA in 1944.

Two women's colleges, New Jersey College for Women and Mount Holyoke College, awarded Wheeler honorary DSc degrees, in 1932 and 1937, respectively. Letters written at the time of her retirement in 1948 and talks given at a symposium about her life and work in 1980 indicate that she treated her students and young faculty to the same type of care and encouragement that she had received from Alexander and Emma Pell when she was a student. In 2006 Anna Pell Wheeler was one of forty-five women mathematicians featured with an individual poster containing a brief biography at the "Connecting Women in Mathematics Across Canada" workshop held at the Fields Institute. She and Grace Bareis were the only two women in our study so honored.

After her retirement Anna Pell Wheeler continued to live in Bryn Mawr but spent summers in a cottage, named QED, that she and Arthur Wheeler had bought in St. Hubert's, New York, in the Adirondack Mountains. She also spent some time in northern California, attending section meetings of the MAA in San Francisco in January 1949 and 1951. In 1953 she endowed a mathematics scholarship at the University of South Dakota honoring Alexander Pell. In 1960 anonymous gifts in honor of Anna Pell Wheeler and in memory of Charlotte Angas Scott established funds for prizes awarded annually in their names. Anna Pell Wheeler was eighty-two when she died in Bryn Mawr in March 1966 a few months after suffering a stroke. She is buried next to Alexander Pell in the Lower Merion Baptist Church Cemetery in Bryn Mawr, which accepts members of all faiths for burial.

Organizational affiliations: AMS, MAA (charter member), AAAS, Sigma Xi.

Thesis and dissertation:

1904 [Johnson, A.] The extension of the Galois theory to linear differential equations. MA, University of Iowa.

1910 [Pell, A. J.] I. Biorthogonal systems of functions. II. Applications of biorthogonal systems of functions to the theory of integral equations. PhD dissertation, University of Chicago, directed by Eliakim Hastings Moore. Printed version, 1911, New Era Printing Co., Lancaster, Pa., reprinted from *Trans. Amer. Math. Soc.* 12:135–80.

Publications:

1910a [Pell, A. J.] Existence theorems for certain unsymmetric kernels. *Bull. Amer. Math. Soc.* 16:513–15. Reviews: *JFM* 41.0392.02 (E. Lampe); *Rev. semestr. publ. math.* 19, pt. 1: 7 (D. J. Korteweg).

1910b [Pell, A. J.] On an integral equation with an adjoined condition. *Bull. Amer. Math. Soc.* 16:412–15. Reviews: *JFM* 41.0392.01 (E. Lampe); *Rev. semestr. publ. math.* 19, pt. 1: 6 (D. J. Korteweg). Presented to the AMS, Chicago, 31 Dec 1909; abstract: *Bull. Amer. Math. Soc.* 16:298 #9.

1911a [Pell, A. J.] Applications of biorthogonal systems of functions to the theory of integral equations. *Trans. Amer. Math. Soc.* 12:165–80. Published version of part II of PhD dissertation. Reviews: *JFM* 42.0369.03 (O. Toeplitz); *Rev. semestr. publ. math.* 20, pt. 1: 7 (D. Coelingh). Presented by title as "Applications of biorthogonal systems to integral equations" to the AMS, Princeton, NJ, 13 Sep 1909; abstract: *Bull. Amer. Math. Soc.* 16:58–59 #7.

1911b [Pell, A. J.] Biorthogonal systems of functions. *Trans. Amer. Math. Soc.* 12:135–64. Published version of part I of PhD dissertation. Reviews: *JFM* 42.0369.02 (O. Toeplitz); *Rev. semestr. publ. math.* 20, pt. 1: 6–7 (D. Coelingh). Presented as "Biorthogonal systems" to the AMS, Chicago, 10 Apr 1909; abstract: *Bull. Amer. Math. Soc.* 15:437 #25.

1914 [Pell, A. J.] Non-homogeneous linear equations in infinitely many unknowns. *Ann. of Math.* 2nd ser., 16:32–37. Reviews: *JFM* 45.0519.01 (G. Szegö); *Rev. semestr. publ. math.* 23, pt. 2: 11 (W. A. Wythoff). Presented as "Non-homogeneous linear equations in infinitely many variables" to the AMS, New York City, 25 April 1914; abstract: *Bull. Amer. Math. Soc.* 20:513–14 #10.

1917 [Pell, A. J.] with R. L. Gordon. The modified remainders obtained in finding the highest common factor of two polynomials. *Ann. of Math.* 2nd ser., 18:188–93. Reviews: *JFM* 46.0120.01 (G. Szegö); *Rev. semestr. publ. math.* 26, pt. 1: 14 (W. A. Wythoff).

1919a [Pell, A. J.] A general system of linear equations. *Trans. Amer. Math. Soc.* 20:343–55. Reviews: *JFM* 47.0378.03 (E. Hellinger); *Rev. semestr. publ. math.* 28, pt. 2: 7–8 (P. Mulder). Presented as "Systems of linear equations" to the AMS, New York City, 28 Dec 1917; abstract: *Bull. Amer. Math. Soc.* 24:273 #15.

1919b [Pell, A. J.] Linear equations with unsymmetric systems of coefficients. *Trans. Amer. Math. Soc.* 20:23–39. Reviews: *JFM* 47.0378.02 (E. Hellinger); *Rev. semestr. publ.*

math. 27, pt. 2: 10 (P. Mulder). Presented by title as "Infinite systems of linear equations with unsymmetric systems of coefficients" to the AMS, New York City, 7 Sep 1910; abstract: *Bull. Amer. Math. Soc.* 17:73–74 #20.

1922 [Pell, A. J.] Linear equations with two parameters. *Trans. Amer. Math. Soc.* 23:198–211. Reviews: *JFM* 48.0476.03 (E. Hellinger); *Rev. semestr. publ. math.* 31, pt. 2: 12 (P. Mulder). Presented as "Two linear integral equations with two parameters" to the AMS, New York City, 25 Oct 1919; abstract: *Bull. Amer. Math. Soc.* 26:149 #7 .

1927a Linear ordinary self-adjoint differential equations of the second order. *Amer. J. Math.* 49:309–20. Reviews: *JFM* 53.0422.01 (M. Müller); *Rev. semestr. publ. math.* 33, pt. 2: 4 (W. G. J. ten Pas). Presented as "Linear ordinary differential equations of the second order" to the AMS, New York City, 1 Jan 1926; abstract: *Bull. Amer. Math. Soc.* 32:121 #4.

1927b The theory of quadratic forms in infinitely many variables and applications. *Bull. Amer. Math. Soc.* 33:664–65. Review: *JFM* 53.0363.03 (G. Feigl). Synopsis of five colloquium lectures presented to the AMS, Madison, WI, 6–10 Sep 1927.

1935 Spectral theory for a certain class of non-symmetric completely continuous matrices. *Amer. J. Math.* 57:847–53. Reviews: *JFM* 61.0421.01 (F. Rellich); *Zbl* 013.06504 (M. H. Stone).

Abstracts not listed above:

1910 [Pell, A. J.] On a functional equation. *Bull. Amer. Math. Soc.* 16:459–60 #3. Presented to a meeting of the AMS, Chicago, 8–9 Apr 1910.

1913 [Pell, A. J.] Linear equations in infinitely many unknowns. *Bull. Amer. Math. Soc.* 19:57 #10. Presented to a meeting of the AMS, Philadelphia, PA, 10–11 Sep 1912.

1921 [Pell, A. J.] Integral equations in which the kernel is quadratic in the parameter. *Bull. Amer. Math. Soc.* 27:56 #9. Presented to a meeting of the AMS, Chicago, 7–11 Sep 1920.

1925 [Pell, A. J.] A hyperbolic differential equation. *Bull. Amer. Math. Soc.* 31:210 #7. Presented to a meeting of the AMS, Washington, DC, 29 Dec 1924–1 Jan 1925.

1939 Functions and sequences. *Amer. Math. Monthly* 46:135 #1. Presented to the MAA, Collegeville, PA, 26 Nov 1938.

Presentation not listed above:

Bilinear and quadratic forms in infinitely many variables. Invited address presented to the AMS, New York City, 23 Oct 1923.

References to: AmMSc 3–8, 9P; AmNatBi; AmWomSc; AZWoSci; BiDAmEd; BiDWSci; BioWMath; CamDcAB 1; DcWomW; InWom SUP; MacTutor; NotMat; NotSci 2; NotTwCS 1S; NotWoSc; Poggendorff 6, 7b; Sc&ItsT 6; WhoAm 26; WomSc; WomScSearch; WomWorHis; WomWWA.

"Woman Wins Honor at Girls' College." *New York Times*, 5 Jun 1932.

"Dr. Anna Pell Wheeler." (Obituary) *New York Times*, 1 Apr 1966.

Grinstein, Louise S. and Paul J. Campbell. "Anna Johnson Pell Wheeler, 1883–1966." *AWM Newsletter* 8 (Sep 1978): 14–16 and 8 (Nov 1978): 8–12.

Grinstein, Louise S. "Wheeler, Anna Johnson Pell, May 5, 1883–March 26, 1966. Mathematician." In *Notable American Women: A Biographical Dictionary, The Modern Period*, eds. Barbara Sicherman and Carol Hurd Green, 725–26. Cambridge, MA: Belknap Press of Harvard University Press, 1980.

Grinstein, Louise S. and Paul J. Campbell. "Anna Johnson Pell Wheeler: Her life and work." *Historia Mathematica* 9 (1982): 37–53.

Grinstein, Louise S. and Paul J. Campbell. "Anna Johnson Pell Wheeler (1883–1966). In *Women of Mathematics: A Biobibliographic Sourcebook*, eds. Louise S. Grinstein and Paul J. Campbell, 241–46. Westport, CT: Greenwood Press, 1987.

Case, Bettye Anne, ed. "Reminiscences about Anna Johnson Pell Wheeler," in *A Century of Mathematical Meetings*, ed. B. A. Case, 311–19. Providence, RI: American Mathematical Society, 1996. (Adapted from "Anna Johnson Pell Wheeler (1883–1966): Colloquium Lecturer, 1927." *AWM Newsletter* 12 (Jul-Aug 1982): 4–13.)

Other sources: PhD dissertation vita 1911; Owens questionnaires 1937, 1940; Owens Papers; Green and LaDuke, "Contributors to American Mathematics"; Charlotte A. Scott, "Dr. Alexander Pell," (Obituary) *Bryn Mawr College News*, 9 Feb 1921, 2; Lewis E. Akeley, *This Is What I Had in Mind* (Vermillion: University of South Dakota, 1959); Von Hardesty and John D. Unruh, Jr., "The enigma of Degaev-Pell," *South Dakota History* 3 (1) (Winter 1972): 1–29; Richard Pipes, *The Degaev Affair: Terror and Treason in Tsarist Russia* (New Haven, CT: Yale University Press, 2003); MacTutor (Alexander Pell); *American National Biography* 23:127–28 (Wheeler, Arthur Leslie); Iowa State Census 1885, 1895; US Census 1900 IA, 1910 IL, 1920 PA.

Last modified: January 22, 2016.

WHELAN, A. Marie. September 6, 1895–June 14, 1966.
Goucher College (BA 1918), Johns Hopkins University (PhD 1923).

Anna Marie Whelan was born in Baltimore, Maryland, the sixth of eight children of Honora A. (Conroy) (b. 1865) and James J. Whelan (b. 1862). Her parents had each emigrated from Ireland as children in about 1875 and had married eight or nine years later. In 1900, according to the census report, the family included seven children: James E. (b. 1885); Catherine M. (b. 1886); Elenora [Eleanora] (b. 1888); Jim Joseph [James J.] (b. 1890); John Joseph (b. 1892); Anna M., (b. 1894 [*sic*]); and Loretta E. (b. 1897). The father's occupation was listed as clerk. In 1920 it was reported that six children were living at home in Baltimore, including the eighth child, Laura E., age nineteen. That year the father's occupation was listed as salesman at a clothiers.

After Marie Whelan graduated from Western High School in Baltimore in 1914, she entered Goucher College and graduated four years later. She began her graduate studies at the Johns Hopkins University in Baltimore in the fall of 1918. Except for the year 1920–21 when she taught in Pullman, West Virginia, she attended Johns Hopkins continuously until she received her doctorate in 1923. She attended the summer school in 1919 and held a university fellowship in mathematics 1919–20. A Johns Hopkins directory indicates that she also taught in the summer sessions of 1919 and 1920. While her dissertation was written under the direction of Frank Morley, in her dissertation vita she also acknowledged the "valuable suggestions" received from A. B. Coble, an earlier PhD student of Morley and former Johns Hopkins faculty member, who was then on the faculty at the University of Illinois. Her subordinate subjects at Johns Hopkins were applied mathematics and geophysics.

After receiving her PhD in 1923, Marie Whelan, who sometimes used the name A. Marie Whelan professionally, taught for two years each at Olivet College in Michigan and Dominican College of San Rafael in California. She joined the faculty at Hunter College as instructor in 1927 and was an assistant professor from 1932 until her retirement in 1965. During her first decade there she often was associated with the evening and extension sessions.

In addition to the two plays she published in the Mathematics Clubs section of the *Monthly*, **1930** and **1938**, Whelan also wrote a two-act play, "Grabitall," that was presented by the mathematics club at Hunter College in the spring of 1937. The play dealt with the mathematics of the Townsend Plan, a proposal to end the Great Depression by instituting a pension plan for all retirees over the age of sixty.

Anna Marie Whelan died in 1966 in the Lenox Hill Hospital in Manhattan after a short illness. She was seventy. After her death, a high requiem mass was celebrated at the Immaculate Heart of Mary Church and she was buried in New Cathedral Cemetery in Baltimore. She was survived by her sister Loretta E. Whelan with whom she had lived in New York, a sister-in-law, and a niece and nephew.

Organizational affiliations: MAA, Phi Beta Kappa.

Dissertation:
1923 The theory of the binary octavic. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Handwritten. Printed version, 1926, reprinted from *Amer. J. Math.* 48:73–100.

Publications:
1926 The theory of the binary octavic. *Amer. J. Math.* 48:73–100. Presented by F. Morley to the AMS, New York City, 24 Feb 1923; abstract: *Bull. Amer. Math. Soc.* 29:147–48 #4. Published version of PhD dissertation. Review: *JFM* 52.0109.03 (R. Brauer).
1930 Discord in mathematics land. *Amer. Math. Monthly* 37:151–56. Review: *JFM* 56.00-75.04 (L. Buchhorn).
1938 It can't happen here: A mathematical musical farce. *Amer. Math. Monthly* 45:617–28.

Presentation not listed above:
Invariants of the binary octavic. Presented to the MAA, Baltimore, MD, 12 May 1923.

References to:
"Deaths: Whelan." *Baltimore Sun*, 16 Jun 1966.
"Miss Whelan, Ex-Hunter Professor." *Baltimore Evening Sun*, 16 Jun 1966.

Other sources: PhD dissertation vita 1923; Hunter College Archives; Ferdinand Hamburger Archives, The Johns Hopkins University; communication with Goucher College Alumnae Association (via Rochelle Adler Effron); Cockey, "Mathematics at Goucher"; US Census 1900, 1920 MD.

Last modified: December 14, 2008.

WHITE, Marion Ballantyne. March 28, 1871–January 30, 1958.
University of Michigan (PhB 1893), University of Wisconsin (MA 1906), University of Chicago (PhD 1910).

Marion Ballantyne White was the third of five children of Jennie E. (McLaren) and Samuel Holmes White. Her mother was born in Glasgow, Scotland, in 1840 and was a teacher living in Chicago before her marriage in 1865. Marion White's father, also a teacher, was born in New York in 1830 and was a widower at the time of his marriage to Jennie McLaren. He held a bachelor's degree from the University of Michigan and a law degree from the Albany Law School. After finishing his education he was a principal of public schools in Chicago and then of the Peoria Normal School. He served in many important educational positions in Illinois and nationally. He edited the *Illinois Teacher* for eight years and was president of the Illinois State Teachers' Association; he was secretary of the National Education Association in 1866, 1872, and 1873, and was president in 1874. He died in 1882. Her siblings were older brothers, Samuel Dexter (ca. 1865–1941) and James McLaren (1867–1933); younger brother, Alfred Holmes (1873–1953), and sister, Jennie P. (b. 1876). Marion White was born in Peoria, Illinois, and did her precollege work in the public schools there.

White was a student at Smith College 1888–89 but left after one year and taught in one of the Peoria public schools 1889–90. She enrolled in the University of Michigan in October 1890 and graduated three years later, the same year as her younger brother, Alfred. The two years after her graduation, Marion White taught mathematics in the high school in Pueblo, Colorado. During 1895–99 and 1900–01 she taught mathematics in the Peoria high school. In the intervening year, 1899–1900, she traveled abroad with her mother and sister; the travels included Munich, where she studied in the winter.

Marion B. White was instructor of mathematics at the University of Illinois from 1901 to 1908. While she was at Illinois, the mathematics club was organized in 1902–03, and the first PhD was granted in 1903. White earned her master's degree at the University of Wisconsin in 1906 by studying there during three summers. After leaving Illinois she did her doctoral work at the University of Chicago from 1908 to 1910 and was a fellow her last year there. While in Chicago, White was living with her widowed mother and her younger sister, who was a high school teacher. Her dissertation was the third directed by G. A. Bliss, and White was the first student of Bliss who had not begun the dissertation under the direction of Heinrich Maschke or Oskar Bolza. White's dissertation in the calculus of variations appeared in the 1912 *Transactions* of the AMS; in a 1929 paper in the *Bulletin* of the AMS, Marston Morse mentioned her paper, noting that he did not use her results but thought them interesting.

In 1910 White joined the faculty at the University of Kansas as assistant professor. While there, she helped with a teacher placement bureau to assist graduates obtain teaching positions in secondary schools. In 1913–14, she was one of three faculty members to give a paper on integral equations to the department. In his history of the mathematics department at the University of Kansas, G. Baley Price includes a letter of March 18, 1914, to the dean from the the department chairman who wrote, "The department believes that Professor Marion B. White is entitled to promotion to an associate professorship on account of her effective work in the department and in addition on account of her work and influence among the young women of the university, as well as her untiring energy in other lines of university activity" (607). Price also quotes Wilimina Everett Pitcher who recalls the university in the period 1903–11: "Marian [*sic*] White may have been an experiment. K.U. boys were not used to women in the math department. She was there because [John Wesley] Young brought her.... She was a very likable person" (674–75). Young left Kansas in 1911, only one year after White came and three years before she left.

In 1914 Marion White moved to Michigan State Normal College (now Eastern Michigan University) in Ypsilanti, where she had been appointed associate professor of mathematics and dean of women. She served as dean for two years and associate professor four years. In 1918 she joined the faculty at Carleton College in Minnesota and remained there until her retirement at age sixty-six in 1937 because of the ill health of a relative. She was assistant professor 1918–30, dean of women 1922–24, and associate professor 1930–37. The Carleton alumni magazine notice of her death records that "she was an especially successful classroom teacher – known ... for the personal stimulus and encouragement she gave the students who passed through her classes.... She was personally an ardent participant in the work of many campus and community activities such as the Carleton Chapter of Phi Beta Kappa and the American Association of University Women." She served terms in 1931–32 and 1936–37 on the executive committee of the Minnesota Section of the MAA.

After her retirement in 1937, White moved to Pasadena, California, where she spent the last two decades of her life. She died at a local hospital in Pasadena in 1958 at age eighty-six. She was survived by a cousin in Pasadena and by six nieces and a nephew.

Organizational affiliations: AMS, MAA (charter member), AAUW, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:

1906 The asymptotic lines on the anchor ring. MA thesis, University of Wisconsin. Typescript. See also **1907**.

1910 The dependence of the focal point on curvature in space problems of the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Printed version, 1912, New Era Printing Co., Lancaster, PA, reprinted from *Trans. Amer. Math. Soc.* 13:175–98.

Publications:

1907 The asymptotic lines on the anchor ring. *Ann. of Math.* 2nd ser., 8:103–17. Published version of MA thesis. Reviews: *JFM* 38.0662.01 (P. Zühlke); *Rev. semestr. publ. math.* 16, pt. 1: 11 (W. A. Wythoff).

1912 The dependence of focal points upon curvature for problems of the calculus of variations in space. *Trans. Amer. Math. Soc.* 13:175–98. Published version of PhD dissertation. Reviews: *JFM* 43.0464.02 (H. Hahn) 43:464–65; *Rev. semestr. publ. math.* 21, pt. 1: 7–8 (P. Mulder). Presented by J. N. Van der Vries as "The dependence of the focal point on curvature in space problems in the calculus of variations" to the AMS, St. Louis, MO, 2 Dec 1911; abstract: *Bull. Amer. Math. Soc.* 18:234 #5.

References to:

"Marion B. White." (Obituary) *Carleton College Voice*, n.d.
Obituary. unidentified newspaper clipping.

Other sources: PhD dissertation vita 1912; Owens questionnaires 1937, 1940; Owens Papers; Carleton College Archives; University of Michigan Alumni Records Office; University of Wisconsin Memorial Library; communications with Carleton College Archives and Smith College Archives; Price, *History of the Department of Mathematics of the University of Kansas*; NatCAB 13 (White, Samuel Holmes); US Census 1860, 1870, 1880, 1900, 1910 IL, 1930 MN.

Last modified: July 20, 2009.

WIDDER, Vera (Ames). December 12, 1909–May 18, 2004.
University of Saskatchewan (BA 1931, MA 1932), Bryn Mawr College (PhD 1938).

Vera Adela Ames was born in Milestone, Saskatchewan, south of Regina, and was the daughter of Margaret Ophelia (Mooney) (1876–1960) and Charles Edgar Ames (1878–1980), both originally from Ontario. Her mother attended school in Brussels, Ontario, and became a seamstress; her father attended five different rural schools and later farmed near Milestone. Her parents, who had known one another in Ontario, married in 1905 after their families moved to southeastern Saskatchewan. There were five children: Margaret Iola (b. 1907), Vera, Charles Roy (b. 1912), Alice Isabel (b. 1914), and Thelma Gertrude (b. 1916). Writing for the 1984 Milestone local history book, Roy and Thelma described their early years: "We recall a home where we found love, caring, fun, and discipline. Dad led regular family worship. Mother loved to read and often read aloud to us. We were encouraged in our school work and in music. When we were small Mother and Dad played piano and violin for family singsongs." The children "attended Milestone School, the daily trips [being] made with horses. . . . Both Iola and Vera attended Regina College to obtain grade 12 as that grade was not taught [then] in Milestone" (*From Prairie Plow till Now*, 84, 85). The family was active in the Milestone United Church, a local union of the Methodist and Presbyterian churches.

Vera Ames originally intended to take a teacher training program after finishing high school so that she could teach in a country school. However, as she reported in 1981, "farming was prosperous in the late '20s and my parents asked if I wanted to go to university. I thought that was a nice idea so I did. I planned on taking teacher training and teaching high school when I finished university" (Smithsonian tapes). Ames attended the University of Saskatchewan from 1928 until 1932, when she received her master's degree. She had earned her BA in the customary three-year program, with high honors in mathematics, in 1931. That year she was also one of two awarded the University Gold Medal, given only to those "whose standing is considerably in advance of that required for High Honors or Great Distinction." She later wrote that she "had been able to finance [her] senior year, thanks to the generosity of Professor Dines and Dean Ling who paid [her] out of their own pockets to mark their calculus students papers" (*From Prairie Plow till Now*, 85). She spent her last two years at Saskatchewan as an assistant in the mathematics department.

After receiving her master's degree, Ames was a resident fellow at Bryn Mawr College 1932–34. The following year she was a substitute instructor at H. Sophie Newcomb College for Marie Weiss, who was studying with Emmy Noether at Bryn Mawr College that year. Nola Anderson (Haynes) was chairman of the mathematics department at Newcomb at the time. The next year Ames was a part-time teacher at the Baldwin School in Bryn Mawr, while continuing her graduate studies at the college. In 1936–37 she was a teacher at Miss Fine's School in Princeton, New Jersey. Ames returned as an instructor to the University of Saskatchewan in 1937 and remained there for two years. In 1938 she received her doctorate from Bryn Mawr with a dissertation directed by Anna Pell Wheeler on systems of linear equations in infinitely many unknowns. A shortened version of the title, "Linear equations with n parameters," appeared on the 1938 Bryn Mawr commencement program and in the announcement of her dissertation in the *Bulletin* of the AMS.

Vera Ames and David Vernon Widder, who had met at Anna Pell Wheeler's summer home in the Adirondacks, were married on June 12, 1939. David V. Widder was born March 25, 1898, in Harrisburg, Pennsylvania; received his BA 1920, MA 1923, and PhD 1924 from Harvard; and was on the faculty there at the time of their marriage. He had taught at Bryn Mawr 1924–31. He remained on the faculty at Harvard until his retirement in 1968. He was assistant professor 1931–32, associate professor 1932–37, and professor 1937–68. He

was a Sheldon fellow in Paris 1920–21 and a National Research Council fellow at Chicago and Rice 1926–27. He had a Guggenheim fellowship in 1935–36 and Fulbright fellowships in 1955–56 and in 1962–63.

Vera Widder was an instructor at Cambridge Junior College 1942–44 and 1945–47. She was a lecturer at UCLA during 1948–49 and at Tufts College 1950–51. According to her obituary, she also tutored as a volunteer as part of the Boston school integration program and in the Concord prison. The Widders had two children: a son, David Charles, born in about 1940, and a daughter, Edith Anne, born in Boston in June 1951. Vera Widder wrote in 1984 that she has a "son with a Masters in Engineering who works with computers and robots, and a daughter with a PhD in Biology who sometimes sails the ocean in research vessels" (*From Prairie Plow till Now*, 85).

Vera Ames Widder and D. V. Widder both contributed written reminiscences to a symposium in honor of Anna Pell Wheeler sponsored by the Association for Women in Mathematics and held at the joint mathematics meetings in Ann Arbor, Michigan, in August 1980. Vera Widder wrote, "Though Anne successfully combined career and marriage, it was not an easy road. During most of the long years of Mr. Pell's illness, she carried a heavy teaching program and the economic problems of living on a woman's salary. During her happy years in Princeton, as a professor's wife, I suspect she was influenced by a fairly prevalent attitude: 'One career in a home is enough' - words used by George David Birkhoff [D. V. Widder's advisor at Harvard] to me in 1939, soon after Dave and I were married" (**1982**, 10).

Both Widders were skilled pianists and bridge players. David Vernon Widder died of a heart attack at their home in Arlington, Massachusetts, on July 8, 1990. A memorial service was held in a United Universalist church in Arlington. Vera Widder remained in Arlington until 1998 when she moved to Sarasota, Florida, where she died at age ninety-four in 2004. She was survived by her two children, two grandsons, two great-grandchildren, and a brother and two sisters. Contributions in her name could be made to Planned Parenthood in Sarasota. Her estate plans included gifts to Bryn Mawr College and the Unitarian Universalist Service Committee.

Organizational affiliations: AMS, MAA.

Dissertation:

1938 [Ames, V.] On systems of linear equations in Hilbert space with n parameters. PhD dissertation, Bryn Mawr College, directed by Anna Pell Wheeler. Typescript. Microfilm: 1944 [Widder, V. A.], University Microfilms, #670. Abstract: [Widder, V. A.] *Microfilm Abstracts* 6:96–97.

Publications:

1982 Vera Ames Widder. In "Anna Johnson Pell Wheeler (1883–1966): Colloquium Lecturer, 1927," ed. B. A. Case, 10. *AWM Newsletter* 12 (4): 4–13. Adaptation: 1996, "Reminiscences about Anna Johnson Pell Wheeler." In *A Century of Mathematical Meetings* ed. B. A. Case, 311–19. Providence, RI: American Mathematical Society.

References to: AMSc 8, 9P.

"Vera A. Widder." (Obituary) *Arlington* (*MA*) *Advocate*, 27 May 2004.

Other source: Owens questionnaire 1940; Smithsonian meeting tapes 1981; University of Saskatchewan Archives; *From Prairie Plow till Now: Milestone and Districts*, Milestone History Book Committee, 1984; "FAS Memorial Minute: David V. Widder," *Harvard University Gazette*, 11 Dec 1997.

Last modified: January 22, 2016.

WILLIAMS, Emily (Coddington). October 21, 1873–August 8, 1952.
University of London (BA 1896), Columbia University (MA 1898, PhD 1905), New York University (LLB 1913).

Emily Matilda Coddington was born in New York City, the only child of Julia (Fellows) (1840–1926) and Jefferson Coddington (1832–1876), both of New York City and both descended from early seventeenth-century colonial settlers. Her parents married in December 1872. Her father, who had been married previously, was a graduate of Columbia College and an attorney in the city. In 1880 the six-year-old Emily and her mother were living with her maternal grandmother at 24 West 58th Street in Manhattan, her father having died four years earlier. The household also included six other family members and six servants. This was the primary residence for Emily Coddington until her marriage.

Coddington studied at private schools in the New York City area, beginning with Mrs. Wallin's Kindergarten and including Miss Mason's School in Tarrytown and Miss Peebles' School and the Brearley School in New York City until 1892. In 1891, while at the Brearley School, she was one of four women to earn a certificate for having passed satisfactorily the examinations for women "in accordance with the terms prescribed for admission to the Freshman Class of Harvard College" (*Harvard University Catalogue 1891–92*, 399). This certificate entitled Coddington to admission to the "Harvard Annex," a Cambridge institution for women run by the Society for Collegiate Instruction of Women. The "Harvard Annex" offered classes taught by Harvard faculty and was the precursor to Radcliffe College. While there is no indication that she attended the "Harvard Annex," Coddington matriculated at the University of London in June 1894 and received her Intermediate Arts in 1895 and her BA in 1896. Also in 1896 she wrote what would be her master's thesis for a degree in mathematics, with minors in mechanics and Greek, that was awarded two years later by Columbia University. She wrote both this thesis and her PhD dissertation on historical topics. In her dissertation she referred to several papers by the Swedish geometer A. V. Bäcklund. Some time before she received her doctorate in 1905 she published an English translation of an 1883 paper of his. Although Coddington never took any paid positions in mathematics, she did maintain some contact with the mathematical community. She kept her membership in the AMS until her death. She attended the International Congress of Mathematicians in Rome in 1908 and in Cambridge, England, in 1912, and she often attended meetings of the AMS in New York City until shortly before her marriage in 1917.

In 1903 Emily Coddington became a member of the Women's Advisory Committee of New York University's Council of the University. She attended the Law School of NYU starting in 1909 and was admitted to the New York Bar in January 1912 before receiving her law degree from New York University in 1913. In her 1911 application to the Committee on Character of the Bar Association she indicated that she had neither been employed in, nor studied law in, a law office, nor had she ever been engaged in any business or profession other than the law. A decade later she indicated that she had never practiced law. The *New York Times* listed Coddington among the "many prominent New York women" to be seated in boxes at an anti-suffrage meeting to be held at Carnegie Hall in 1915. She also continued her service on the NYU Women's Advisory Committee and served as treasurer at least during 1907–08 and as secretary at least during 1915–17.

On November 5, 1917, at the age of forty-four, Coddington married William Henry Williams (1876–1943), an executive with an exporting business at the time of their marriage. William Henry Williams had been educated at Pratt Institute and Packard Business College and was chairman of the board of North Central Texas Oil Company at the time of his death. Both before and after her marriage Emily Coddington Williams lived in New York City, although she and her husband also had a summer home, Villa Rosa, in Newport, Rhode Island. They had no children.

Emily Coddington Williams had wide-ranging interests. They included gardening, genealogy, and the writing of fiction among many others. In particular, she was an active member of the Garden Club of America, was at one time on the board of directors of the International Garden Club in Pelham Bay Park, and belonged to the Tuxedo, Piping Rock, Colony, and Cosmopolitan clubs. In 1914 she secured a copyright for a typed one-act play called "Then." After her marriage she published another one-act play, two novels, and a sketch of William Coddington, a colonial governor of Rhode Island.

During the course of her life Emily C. Williams made many trips to Europe, frequently with her mother and later with her husband. In addition to the trips to England between 1894 and 1896 while she was a student in London and in 1908 and 1912 for the mathematical congresses in England and in Italy, it appears that she made several other voyages between 1905 and 1914 and nearly every year with her husband in the 1920s and 1930s. After the death of her husband in 1943, Williams moved from their townhouse on East 63rd Street in New York City to the Hotel Pierre, also in Manhattan.

In 1952 Williams made her last trip to Europe, on the Queen Mary. After having fractured her hip on board ship in April, Emily Williams died at the American Hospital in Paris in August 1952 at age seventy-eight. Her estate, which included a large amount of real estate and was estimated at $12,000,000, was divided among her two godchildren and charitable groups in New York City and Newport, Rhode Island. The New York organizations included the New York Genealogical and Biographical Society, the Colonial Dames of America, the Marble Collegiate Church, and Peabody Home for Aged and Indigent Women. The Rhode Island organizations included Trinity Church, the Redwood Library, the Reading Room, and the Newport Historical Society.

Organizational affiliations: AMS, MAA.

Thesis and dissertation:

1896 [Coddington, E. M.] The historical development of the theory of determinants. MA thesis, Columbia University. MA granted 1898.

1905 [Coddington, E.] A brief account of the historical development of pseudospherical surfaces from 1827 to 1887. PhD dissertation, Columbia University. Printed, 1905, Press of the New Era Printing Co., Lancaster, PA.

Publications:

n.d. (Translator from the Swedish) *Concerning Surfaces with Constant Negative Curvature*, by A. V. Bäcklund. Lancaster, PA: Press of the New Era Printing Co.

1925 *Pals; A One-Act Play.* New York: J. J. Little and Ives Co.

1927 *Homing Pigeon.* New York: The MacCaulay Co. Review: *New York Times*, 18 Dec 1927; incorrectly lists author as Emily Wildington Williams.

1929 *Quest for Love.* New York: The MacCaulay Co.

1941 *William Coddington of Rhode Island, A Sketch.* Boston: Merrymount Press.

References to:
"Rally against Suffragists." *New York Times*, 18 Oct 1915.
"Miss Coddington a Bride." *New York Times*, 6 Nov 1917.
"Estate Guardians Named - Court Acts in Case of Injured Millionaire Widow." *New York Times*, 8 Aug 1952.
"$20,000,000 Bond Is Set; Record Precedes Death in Paris of Mrs. E. C. Williams." (Obituary) *New York Times*, 9 Aug 1952.
"Will Aids Groups Here - Local Institutions to Get Sums from Mrs. Williams' Estate." *New York Times*, 20 Aug 1952.
"Mrs. William Henry Williams." (Obituary) *New York Genealogical and Biographical Record* 84 (Jan 1953): 38.

Other sources: Communications with The Brearley School archivist, the Committee on Character and Fitness of the First Judicial Department of New York State, the Historic Collections Administrator of the University of London Library, and the New York University Archives; Lila James Roney, "William Henry Williams: 1876–1943," *New York Genealogical and Biographical Record* 74 (Oct 1943): 138–39; US Census 1870, 1880, 1900, 1910 NY.

Last modified: July 20, 2009.

WILLIAMS, Martha (Hathaway). January 25, 1914–July 22, 1989.
Wellesley College (BA 1935), Massachusetts Institute of Technology (MS 1936, PhD 1939).

Martha Eldora Hathaway was born in Montclair, New Jersey, the daughter of Sarah Emma (Vaughan) (b. ca. 1885) and Joseph Wood Hathaway (b. 1885), natives of Massachusetts who married in about 1911. She had younger brothers, Edward W. (1916–1994) and Vaughan (1923–2003). Her father graduated from the Massachusetts Institute of Technology in 1910 and worked for many years for Western Electric Company in New York City. In 1918 he described his occupation as electrical engineer and in 1930 as accountant.

Martha Hathaway attended public schools in Montclair and graduated with honors in mathematics from the high school there in 1931. She then entered Wellesley College, where she was a Durant scholar and served as president of the Wellesley mathematics club her senior year, 1934–35. She graduated with honors in mathematics in 1935. On June 19, two days after her graduation, Martha Hathaway married Herbert Fitz Randolph Plass in Wellesley, Massachusetts. Herbert Plass was born in Newark, New Jersey, in 1912, and he earned bachelor's and master's degrees in physics from the Massachusetts Institute of Technology (MIT) in 1934 and 1935, respectively, before entering medical school at Harvard University.

Martha H. Plass entered MIT in 1935 and finished her work for her master's degree a year later, having written a thesis supervised by George Rutledge. She continued at MIT, where she minored in physics and where D. J. Struik supervised her doctoral dissertation. During the second semester 1937–38 she was an instructor at Wellesley and was the nominee of Wellesley for its institutional membership to the AMS. In the fall of 1938 she became an instructor at the University of Maryland. In 1939 Martha Plass received her PhD from MIT and Herbert R. Plass received his MD from Harvard; they also were divorced that year.

Martha Plass continued to teach at the University of Maryland as an instructor until 1940, when she married Jonathan Wilber Williams and moved to North Carolina. Jonathan W. Williams was born March 5, 1910, in Olmsted Falls, Ohio. He earned his BS at Baldwin-Wallace College in 1930 and his MS and PhD in organic chemistry in 1932 and 1935, respectively, from Northwestern University. He taught at a junior college the first two years after receiving his doctorate and was on the faculty at the University of Maryland 1937–39 and at the University of North Carolina 1939–41. During the war he worked at the US Naval Research Laboratory 1941–42 and with the National Defense Research Committee of the Office of Scientific Research and Development 1942–45.

Martha Williams was again an instructor at Maryland 1941–43. After the war, Jonathan Williams worked for the DuPont chemical company 1946–54 and then for the Haskell Laboratory of Toxicology and Industrial Medicine, established by DuPont, 1954–60. In 1960 he took a position with the patent and licensing division of the US Department of the Interior.

Martha and Jonathan Williams had two children: a daughter, Susan, born in about 1943, and a son, Jon M., born about five years later. The family lived in Wilmington, Delaware, by the early 1950s. Martha Williams was a member of the Canterbury Garden Club and the Delaware Daffodil Society and was president of the Delaware Federation of Garden Clubs 1962–65. She was president of the Wilmington branch of the AAUW 1961–62.

Jonathan Williams died in June 1970 at the age of sixty. Martha Williams died of heart failure in St. Frances Hospital in Wilmington in 1989 at age seventy-five. She was survived by her two brothers, her two children, and three grandsons. Memorial services were held in the First Unitarian Church in Sharpley, Delaware. Contributions could be made to the Delaware Nature Education Society in Ashland, Delaware.

Organizational affiliations: AMS, AAUW; Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1936 [Plass, M. H.] Review of methods of contour integration. MS thesis, Massachusetts Institute of Technology, directed by George Rutledge.
1939 [Plass, M. H.] Ruled surfaces in Euclidean four space. PhD dissertation, Massachusetts Institute of Technology, directed by Dirk Jan Struik. See also **1942**.

Publication:
1942 Ruled surfaces in Euclidean four space. *J. Math. Phys. Mass. Inst. Tech.* 21:144–58. Published version of PhD dissertation. Review: *MR* 4,170b (V. G. Grove).

References to: AmMSc 7–8, 9P.
"Hathaway–Plass." (Marriage announcement) *New York Times*, 26 May 1935.
"Martha H. Williams." (Obituary) *Wilmington* (*DE*) *News Journal*, 25 Jul 1989.

Other sources: PhD dissertation biography 1939; application for social security account number 1963; Alumnae Register, 1942 Record Number of the Wellesley College Bulletin; communication with Wilmington (DE) Public Library and with MIT Libraries Document Services; AmMSc 10P&B (Williams, Dr. Jonathan W(ilbur)); US census 1930 NJ; SSDI.

Last modified: July 20, 2009.

WILSON, Hazel (Schoonmaker). October 31, 1888–April 23, 1988.
Wellesley College (BA 1911), Radcliffe College (MA 1914), Cornell University (PhD 1927).

Hazel Edith Schoonmaker was the daughter of Christiana M. (Abele), born in 1859 in Pennsylvania, and Arthur Twing Schoonmaker, born in 1860 in Massachusetts. Her parents were married in about 1885; she was born in Philadelphia, Pennsylvania, the elder of two children. Her younger brother, Ernest (1894–1974), was also born in Philadelphia and later became a dentist. Her father graduated from the Hahnemann Medical College of Philadelphia in 1894; shortly thereafter the family was living in Westfield, Massachusetts, where her father was described variously as a homeopathist, a physician, and a surgeon with a specialty in diseases of women and children.

Hazel Schoonmaker graduated from high school in Westfield before she entered Wellesley College, from which she graduated in 1911 with a major in mathematics and a minor in German. She taught in high school in Massachusetts 1912–13 before entering Radcliffe College for graduate work. After receiving her master's degree from Radcliffe in 1914, Schoonmaker taught in high school in New York for a year and was acting associate professor at Denison University in Granville, Ohio, the following year, 1915–16. She taught in high schools in New York 1916–17 and in Pennsylvania 1917–19. During 1920 she was professor at McKendree College in Lebanon, Illinois; in 1920–21 she was acting professor at Augustana College, Rock Island, Illinois; and in 1921–22 she was professor at Gulf Park College for Women, a two-year school that had recently opened in Long Beach, Mississippi. The summer of 1922 she studied at Columbia University and then spent three years as professor at Western College for Women in Oxford, Ohio.

Schoonmaker first attended Cornell University in the summer session of 1924; in her application for admission of July that year she reported that she had done four and a half years of college teaching. She began full-time study there in 1925 and remained at Cornell until 1928. She was appointed a scholar for 1926–27 and received her PhD in 1927 with a major geometry, first minor analysis, and second minor education. She remained at Cornell as resident doctor for a year after she received her doctorate, taking two mathematics courses and preparing typed notes for a course she had taken from Virgil Snyder on plane cubic curves. Those notes are now in the archives at Cornell.

After leaving Cornell, Wilson was an assistant professor 1928–31 at the New Jersey College for Women, the public coordinate college for women associated with Rutgers University in New Brunswick. While there she published three papers in algebraic geometry: her dissertation; a paper coauthored with H. C. Shaub, a fellow student of Snyder at Cornell; and a paper coauthored with Snyder that he mentioned in his 1934 article, "Some recent contributions to algebraic geometry," in the *Bulletin* of the AMS. She then joined the faculty at Hartwick College in Oneonta, New York, replacing Roxana Vivian as the professor of mathematics. She remained for seven years, 1931–38, and left after her marriage in the summer of 1938.

On July 14, 1938, Hazel Schoonmaker married Levi Thomas Wilson (1885–1975), who had a son and a daughter from a previous marriage. The marriage of these two mathematicians was announced in the August 1938 *Monthly*. L. T. Wilson had graduated from Washington and Lee University, received a PhD in mathematics from Harvard University in 1915, and in 1917 began his long career at the US Naval Academy in Annapolis, Maryland.

From 1942 until 1951 Hazel Wilson taught and was chairman of the mathematics department at Annapolis High School; she studied at Johns Hopkins during the summer of 1945. In 1951 L. T. Wilson retired from the Naval Academy and became professor of mathematics and physics and head of the department of physics at Jacksonville State Teachers College (now Jacksonville State University) in Alabama. At the same time, Hazel Wilson

retired from Annapolis High School and became associate professor of mathematics, also at Jacksonville State. In 1952 they both also became instructors at the University of Alabama, Gadsden Center. In 1956 L. T. Wilson went to Doane College in Crete, Nebraska, again as professor of mathematics and physics and head of the department. Hazel Wilson remained at Jacksonville and Gadsden Center for a year until 1957, when she joined her husband at Doane as professor.

They both remained at Doane until 1959 when they moved to Jacksonville, Florida, she as professor of mathematics and he as professor of physics and head of the department of physics and physical sciences at Jacksonville University. They both retired in 1964 as professors emeriti and later lived in Suncoast Manor, an Episcopal retirement community in St. Petersburg, Florida. Throughout many of her working years and for a few years after her retirement, Hazel Schoonmaker Wilson was a frequent contributor of solutions to the Problems and Solutions section of the *American Mathematical Monthly* and to the Problems and Questions section of *Mathematics Magazine*. In the *Monthly* her solutions, or mentions of solutions, averaged about one a year from 1923 to 1968, while those in *Mathematics Magazine* averaged two a year from 1954 to 1967.

Wilson was a member of the honor society Phi Kappa Phi and the education honor society Pi Lambda Theta in addition to those listed below. She was treasurer of the Maryland Congress of Parents and Teachers 1939–45. She was an Episcopalian and was treasurer of the Women's Auxiliary of Saint Luke's 1952–56, when they lived in Jacksonville, Alabama. She was also treasurer 1953–56 of the Faculty Wives Club there. She was a member of the Order of the Eastern Star and of the Florida Academy of Sciences.

In 1974, nearly fifty years after receiving her PhD, Hazel S. Wilson responded to a request for a donation to Cornell by honoring her advisor with a significant contribution to the Virgil Snyder Book Endowment. The income from this endowment fund, financed completely by Wilson, allows the mathematics library to purchase several dozen books every year.

Levi Wilson died in 1975. Hazel Wilson died in Humana Hospital Sunbay in St. Petersburg, Florida, at age ninety-nine in 1988.

Organizational affiliations: MAA, NCTM, Sigma Delta Epsilon, AAUW, Phi Beta Kappa.

Dissertation:

1927 [Schoonmaker, H. E.] Non-monoidal involutions having a congruence of invariant conics. PhD dissertation, Cornell University, directed by Virgil Snyder. Typescript. Printed version, 1929, reprinted from *Amer. J. Math.* 51:439–64.

Publications:

1928 [Schoonmaker, H. E.] The value of the Hotz algebra scales in sectioning college classes in freshman mathematics. *Sch. Sci. Math.* 28:880–84.

1929 [Schoonmaker, H. E.] Non-monoidal involutions having a congruence of invariant conics. *Amer. J. Math.* 51:439–64. Published version of PhD dissertation. Review: *Rev. semestr. publ. math.* 35:2 (W. G. J. ten Pas). Presented to the AMS, New York City, 29 Oct 1927; abstract: *Bull. Amer. Math. Soc.* 34:11 #35.

1931 [Schoonmaker, H. E.] with H. C. Shaub. The Hessian configuration and its relation to the group of order 216. *Amer. Math. Monthly* 38:388–93. Reviews: *JFM* 57.0828.01 (R. Weitzenböck); *Zbl* 002.34703 (E. A. Weiss).

1932 [Schoonmaker, H. E.] with V. Snyder. Two involutorial transformations, of orders 11 and 9, associated with null reciprocities. *Amer. J. Math.* 54:299–304. Reviews: *JFM* 58.1221.02 (G. Feigl); *Zbl* 004.15905 (E. A. Weiss). Presented to the AMS, New Orleans, LA, 28 Dec 1931; abstract: *Bull. Amer. Math. Soc.* 37:834 #404.

1955 Notes on a fraction problem in college algebra. *Math. Mag.* 28:281–82.

1965 A note on age problems. *Math. Teacher* 49:26–27.

Abstract not listed above:

1924 [Schoonmaker, H.] An experiment in sectionizing freshman mathematics. *Amer. Math. Monthly* 31:322 #7. Presented to the MAA, Columbus, OH, 4 Apr 1924.

References to: AmMSc 6–8, 9P–11P; WhoAmW 1–3.

Related manuscript material: Hazel E. Schoonmaker Papers. #37/5/1583. Division of Rare and Manuscript Collections. Carl A. Kroch Library. Cornell University Libraries.

Other sources: Division of Rare and Manuscript Collections, Cornell University Library; Former Members of the Department files, Cornell University Department of Mathematics; Westfield (MA) Athenaeum; communications with Cornell University mathematics librarian and with Hartwick College Archives; "Professors to retire," *Washington Post*, 20 Jun 1951; US Census 1900, 1910, 1920 MA, 1930 NJ; Florida death certificate; SSDI.

Last modified: January 16, 2016.

WOLF, Louise A. October 20, 1898–November 14, 1962.
University of Wisconsin (BA 1931, MA 1933, PhD 1935).

Louise Adelaide Wolf was the elder of two daughters, both born in Milwaukee, Wisconsin, of Caroline (Kupperian) (1875–1973) and John Theodore Wolf (1872–1953). Her mother, who was born in Germany and immigrated to the United States in 1892, and her father, born in Milwaukee, were married in January 1898. Both were formally educated through elementary school. In the 1900 census, her father's occupation was listed as conductor on the street railroad; later he was a truck gardener. Her younger sister, Margarete Wolf (Hopkins), was born in November 1911 and also received a PhD in mathematics from Wisconsin in 1935.

Louise Wolf attended the 26th Avenue School and, for three and a half years, South Division High School, in Milwaukee. She attended Milwaukee-Downer College in 1915–16. She then took a number of positions over the next dozen years. These included working in a dental office and in a public library in Milwaukee, teaching two years in a district school in Nevada, and working two years in Florida. She returned to college at the Milwaukee Extension Division of the University of Wisconsin for the year 1928–29, when her younger sister began college there. They both moved to the Madison campus the following year to complete their undergraduate and graduate work. Louise Wolf was a member of the junior mathematics club her junior and senior years in Madison and was its president her senior year.

In October of her senior year, Warren Weaver wrote to the dean to request an assistantship for Louise Wolf. He noted that Miss Wolf was a senior mathematics major with a straight A record in math. He ordinarily would not appoint a senior to such a position but "Miss Wolf is an exceedingly capable woman, over 30 years of age, who has had experience in teaching and whose university education has been delayed by the fact that she is helping educate a younger sister" (Warren Weaver to Dean Sellery, October 1, 1930, folder 1929–31, box 1, Budget Files, Department of Mathematics, College of Letters and Science, University of Wisconsin–Madison Archives). Louise Wolf taught a course as an assistant during the first semester of her senior year and most subsequent semesters while she was a student at Wisconsin. Typically she taught about three courses a year. She received her bachelor's degree in 1931 and finished the work for her master's degree in 1933. During her first year as a graduate student, the mathematics department, acting as a sustaining member of the AMS, nominated her for membership in the society. Louise Wolf and her sister, Margarete, finished the work for their doctorates in 1935, both as students of Mark H. Ingraham. In the early 1950s results from her dissertation and its published version, **1936**, were cited by several authors.

Louise Wolf immediately took a position with the University of Wisconsin's Extension Division. She was engaged in circuit teaching her first year and traveled regularly between Milwaukee, Fond du Lac, Sheboygan, and Manitowoc giving instruction. Starting in 1936, she taught at the Milwaukee Center, often referred to as the University of Wisconsin in Milwaukee. Around the beginning of War War II she was also a lecturer at the University of Wisconsin in Madison. In Milwaukee she was an instructor 1935–38, an assistant professor until 1951, and an associate professor until her retirement as associate professor emeritus in January 1962. In 1955 the Extension Division had merged with Wisconsin State College to form the University of Wisconsin–Milwaukee.

At her institution Louise Wolf served as faculty advisor to the junior mathematics club several times in the 1930s. She and her sister prepared a talk for presentation to the AMS in 1938. In the 1940s she became active in the Wisconsin Section of the MAA, initially serving on program committees. She was first elected secretary of the section in 1948 and served in that capacity for the next five years. She also served on committees of NCTM

related to its summer meetings in Milwaukee in 1940 and at the University of Wisconsin in Madison in 1950.

Louise A. Wolf died at age sixty-four in Milwaukee in 1962.

Organizational affiliations: AMS, MAA, NCTM, Phi Beta Kappa, Sigma Xi.

Dissertation:

1935 Similarity of matrices in which the elements are real quaternions. PhD dissertation, University of Wisconsin, directed by Mark Hoyt Ingraham. Typescript. Summary: *Summaries of Doctoral Dissertations, University of Wisconsin* 1:128. See also **1936**.

Publications:

1936 Similarity of matrices in which the elements are real quaternions. *Bull. Amer. Math. Soc.* 42:737–43. Published version of PhD dissertation. Reviews: *JFM* 62.1078.03 (H. v. Caemmerer); *Zbl* 015.24206 (C. C. MacDuffee). Presented to the AMS, Ann Arbor, MI, 13 Sep 1935; abstract: *Bull. Amer. Math. Soc.* 41:630 #331.

1944 Review of *Basic Mathematics for War and Industry*, by P. H. Daus, J. M. Gleason, and W. M. Whyburn. *Amer. Math. Monthly* 51:469.

Abstract not listed above:

1938 with M. C. Wolf. The linear equation in matrices with elements in a division algebra. *Bull. Amer. Math. Soc.* 44:639 #384. Presented by M. C. Wolf to the AMS, New York City, 6 Sep 1938.

References to: AmMSc 6–7.

Other sources: PhD dissertation vita 1935; Owens questionnaire 1940; conversation between Margarete Wolf Hopkins (sister) and author, 23 May 1997; University of Wisconsin–Madison Archives; US census 1900, 1920 WI.

Last modified: July 20, 2009.

WOOD, Ruth G. January 29, 1875–May 5, 1939.
Smith College (BL 1898), Yale University (PhD 1901).

Ruth Goulding Wood was the younger of two children of Kate Bassett (Pond) (1850–1932) and Samuel Eugene Wood (ca. 1844–1891). Her mother's family was from Brooklyn, New York, and her father's was from Central Falls, Rhode Island, where she was born. Her parents married in 1869; her father was a bookkeeper in the 1870s and manager of the yarn department of a manufacturing company in the late 1880s. Ruth's brother, Kenneth, was born in 1873 and became a mechanical engineer.

Ruth Wood attended Pawtucket High School in Rhode Island before entering Smith College in Northampton, Massachusetts. She took the literary course at Smith, with major subjects mathematics, German, and the sciences, and graduated in 1898. She entered Yale University immediately after her graduation; she held a scholarship in 1899–1900 and a fellowship in 1900–1901. Although there is no formal indication of her advisor, most of her course work was taken with, and the department recommendation for her PhD in 1901 was signed by, James Pierpont, Percey F. Smith, J. Willard Gibbs, and William Beebe.

Wood was an instructor at Mount Holyoke College 1901–02 before joining the two-person mathematics department at Smith College as instructor in 1902. Eleanor P. Cushing, MA and Smith class of 1879, was professor and had joined the faculty in 1881; Harriet R. Cobb, MA, was instructor and had joined the faculty as assistant in mathematics in 1895. Wood spent her career at Smith except for the year 1908–09, when she was studying at the university in Göttingen. She was instructor 1902–09, associate professor 1909–14, professor 1914–35, and emeritus professor after 1935. She became chairman of the department when Cushing retired in 1922 and remained so until 1928.

Excerpts from the notebook of the mathematical club of Smith give some indication of the interests and activities of Wood. In 1903 she spoke on the laboratory method of teaching mathematics; in 1904 she explained beginning and spherical geometry; in 1907 she spoke on "Transformations," and in 1909 she described her university experience at Göttingen. In 1918 she discussed her work the previous summer at New York Life Insurance Company, and in fall 1928 she and Susan Rambo gave talks about their visit to the International Congress in Bologna. Wood had also attended international congresses in Cambridge, England, in 1912 and in Toronto in 1924. She began attending meetings of the AMS when she was still a graduate student and continued until the summer before her retirement.

Other details emerge from Wood's notes in the *Smith Alumnae Quarterly* and from ship passenger lists. Her interest in traveling is evident. She and her mother were in Europe in 1909; Wood traveled again to Europe in 1912. She spent the summer of 1913 in Newfoundland and was in Europe the following summer. In her July 1929 entry in the *Quarterly* she anticipates a short trip to the Pyrenees in August. She was again in Europe in summer 1933. In February 1934 she began her first sabbatical semester since she joined the Smith faculty in 1902 and traveled in Egypt, Greece, and Turkey with her sister-in-law and two nieces. In June 1935 she resigned from the Smith faculty at age sixty. In August 1936 she reported that the previous winter she went to California via the Canal, visited Yosemite, and did not miss teaching. In February 1937 she sailed on a cruise to South America, went down the west coast, crossed the Andes by auto and mountain lakes by boat.

In 1931 Wood had moved to Florence, Massachusetts, a few miles from Northampton, to a house she had designed. The house included a greenhouse to accommodate her expertise as a gardener. She also had a summer home in Cummington, in the Berkshire foothills. Wood's mother, who had been living with her, died in May 1932.

Wood died of coronary thrombosis at sixty-four in 1939 in Springfield, Massachusetts. She had no immediate survivors. In the minute read at Smith after her death it was

recorded that she "loved the beautiful in music and literature. She was an accomplished needlewoman and an almost professional gardener. She had a genius for friendship and to all who knew her she was the embodiment of thoughtfulness, generosity and courage" (Smith College Archives). Newspaper accounts indicate that upon the death of the last of three beneficiaries of a trust fund she had set up, the fund and accumulated interest were to go to the trustees of Smith College to assist in paying "one or more women professors in the mathematics department a salary equal to the highest salary paid to any member of the teaching staff of the college" (*Springfield Union*, 30 May 1939). In 1949 a gift of $5,000 was given to the college in memory of Wood. Her ashes were interred in Swan Point Cemetery, Providence, Rhode Island.

Organizational affiliations: AMS, MAA, Phi Beta Kappa, Sigma Xi.

Dissertation:
1901 Non-Euclidean displacements and symmetry transformations. PhD dissertation, Yale University. Printed version, 1901, reprinted from *Ann. of Math.* 2nd ser., 2:161–71.

Publications:
1901 The collineations of space which transform a non-degenerate quadric surface into itself. *Ann. of Math.* 2nd ser., 2:161–71. Published version of PhD dissertation. Reviews: *JFM* 32.0632.04 (E. Wölffing); *Rev. semestr. publ. math.* 10, pt. 1: 11–12 (W. A. Wythoff). Presented to the AMS, New York City, 28 Dec 1900; abstract: *Bull. Amer. Math. Soc.* 7:207 #11.
1902 Mathematics as a necessary requirement in a college curriculum. *Smith College Monthly* (May): 523–24.

Abstract not listed above:
1902 Non-Euclidean displacements and symmetry transformations. *Bull. Amer. Math. Soc.* 8:370 #5. Presented to the AMS, New York City, 26 Apr 1902. Based on PhD dissertation.

References to: AmMSc 1–6, AmWomSc, BiDWSci, BioWMath, WomScSearch, WomWWA.
"Smith Fund to Keep Salaries of Women High: Professors of Mathematics Will Benefit from Ruth Wood Will." *Springfield Union*, 30 May 1939.
Obituary. *Smith Alumnae Quarterly* (Aug 1939): 364
"Ruth Goulding Wood." *Yale Obituary Record 1938–1939*.

Other sources: Owens questionnaire 1937; Williams Papers; Smith College Archives; Yale University Archives; Whitman, "Women in the American Mathematical Society before 1900," pt. 3; US Census 1870, 1900 RI, 1910, 1920, 1930 MA.

Last modified: March 26, 2009.

WORTHINGTON, Euphemia Richardson. December 22, 1881–August 30, 1969. Wellesley College (BA 1904), Yale University (PhD 1908).

Euphemia Richardson Worthington was born in Troy, New York, the first of three daughters of Sophia Adelaide (Whidden) (1851–1895) and John Worthington (1840–1913). Her mother was born in Nova Scotia and was boarding in Troy with Harriet Richardson and Richardson's brother in June 1880 before her marriage to the widowed John Worthington in December that year. Her father was born in New York State, had three children by his previous marriage, and was a coal dealer. Her sisters were Jennie Adelaide (1883–1888) and Dorothy (b. 1887). Harriet Richardson was living with the Worthington family in 1900.

Euphemia Worthington attended the Emma Willard School in Troy 1895–1900. She then entered Wellesley College, where she was known as Effie. Her mathematics courses at Wellesley included elementary and college algebra; theory of equations and determinants; plane, solid, plane analytic, solid analytic, modern synthetic, and projective geometry; calculus; and astronomy. She graduated in 1904.

Worthington entered Yale University in 1905 and wrote her dissertation under the direction of James Pierpont. After receiving her PhD in 1908, Worthington taught for a year at the Emma Willard School. From 1909 to 1918 she was an instructor at Wellesley, her undergraduate alma mater. She was one of seven Wellesley faculty who were listed as charter members of the MAA in 1916. In 1918 she left Wellesley to do war work during World War I. She was assistant to the chief engineer of the Gallaudet Aircraft Corporation in East Greenwich, Rhode Island, from July 1918 to May 1919. She reported for the 1919 issue of the Wellesley Class of 1904 Record Book: "This summer I have been working for an aircraft company near Providence and am finding my work, which is doing mathematical work for the chief engineer, very interesting and very far from monotonous, a decided change from teaching freshmen" (Wellesley College Archives). In May 1919 Worthington also took, and passed, the first part of the associate examination of the Actuarial Society of America (ASA). Later in 1919 she was unemployed and living in Pasadena, California. She resumed her position at the Gallaudet Aircraft Corporation and worked there again from March 1920 to January 1922. In May 1920 she passed the second part of the ASA associate examination and apparently never attempted the remaining two parts.

In January 1922 Worthington was appointed instructor in mathematics at the Southern Branch of the University of California. This former state normal school conferred its first bachelor's degree in 1923 and changed its name to the University of California at Los Angeles in 1927. From about that time until her retirement at age sixty-seven, Worthington regularly attended meetings of the Southern California Section of the MAA and regional meetings of the AMS held in southern California. Worthington became assistant professor in 1925 and retired as assistant professor emeritus in 1949. She had leaves with two-thirds salary from March 25 to June 30 in 1929 and from January 1 to June 30 in 1932. She worked as a stress analyst in the engineering department of the Bell Aircraft Company in Buffalo, New York, in summer 1942. She was also designated an emeritus fellow by UCLA in 1954.

For some years after her retirement, Worthington spent summers in Carmel, California, and winters in Victoria, British Columbia, before eventually moving permanently to Victoria. Euphemia Worthington died following surgery for a fall in 1969 at age eighty-seven in Victoria. She had no surviving relatives.

Organizational affiliations: AMS, MAA (charter member), AAAS.

Dissertation:

1908 Some theorems on surfaces. PhD dissertation, Yale University, directed by James Pelham Pierpont.

References to: AmMSc 3–8, 9–11P; BiDWSci.

Other sources: Wellesley College Archives; Yale University Archives; communication with University of California, Los Angeles, Archives and with Wellesley College Archives; US census 1880, 1900, 1910 NY; 1920, 1930 CA.

Last modified: March 11, 2009.

WYANT, Kathryn. January 16, 1897–July 16, 1942.
University of Missouri (BS 1921, MA 1922, PhD 1929).

Emily Kathryn Wyant was born in Ipava, Illinois, the younger of two children of Alice Mary (Dillon) (b. 1864) and Clarence Jacob Wyant (b. 1871), natives of Illinois. Her older brother, Kenneth D., was born in 1894. In 1900 the family was living in Dixon, in northern Illinois, and her father's occupation was described in the census report as "student." Kathryn Wyant attended a country grade school in Bader, Illinois, about twenty-five miles from Ipava. In 1910 the family was living in Bolivar, Missouri, where her father was a merchant. Kathryn graduated from the high school there in May 1914.

Wyant entered the University of Missouri in June 1914 and did most of her undergraduate work in summer sessions there. She taught two winters in rural schools in Polk County, Missouri, and three in the high schools at Callao and Neosho, Missouri, before receiving her BS in education in June 1921.

Wyant was an instructor in mathematics at the University of Missouri from 1921 until 1930. She completed her master's degree at Missouri with a major in physics and a minor in mathematics in 1922. After having attended one summer session at the University of Chicago, she completed the work for her PhD at Missouri with a major in mathematics and a minor in astronomy. Her 1929 dissertation was directed by G. E. Wahlin. She also thanked W. D. A. Westfall, Louis Ingold, E. S. Haynes, and E. R. Hedrick for their interest in her work.

From 1930 to 1933 Wyant was professor of mathematics at Northeastern State Teachers College (now Northeastern State University) in Tahlequah, Oklahoma. From 1933 to 1934 Wyant did postgraduate work at the University of Chicago before joining, in 1934, the faculty at Athens College (now Athens State University) in Athens, Alabama. The college, founded in 1822 as Athens Female Academy, had become coeducational in 1931. She served as chairman of the department of mathematics there until her early retirement in 1940 because of ill health.

Throughout her career Wyant was unusually active in professional and honorary societies. While she was at Missouri she was particularly involved with the mathematics honorary fraternity Pi Mu Epsilon, the graduate women's scientific fraternity Sigma Delta Epsilon, and the MAA. In 1925 she was the corresponding secretary of the University of Missouri chapter of Pi Mu Epsilon when there were only nine chapters. She was national vice president of Sigma Delta Epsilon in 1926 and president from June to December 1926. The following year she was chairman of the Missouri Section of the MAA. Also during this period Wyant became interested in some Diophantine problems and solutions that had appeared in *The Missouri Intelligencer* in 1823 and 1824 and spoke about them to the local Pi Mu Epsilon chapter and to the Missouri Section of the MAA.

While at Northeastern State Teachers College, Wyant transformed the existing mathematics club into the first chapter of Kappa Mu Epsilon, a mathematics honor society for schools that place an emphasis on undergraduate education. This first chapter was installed in 1931 with twenty-four members, and by the end of 1932 there were six chapters. Kappa Mu Epsilon was granted membership into the Association of College Honor Societies in 1968. The society produces a journal, *The Pentagon*, and has grown to over a hundred chapters. In addition to founding Kappa Mu Epsilon, she served as its first national president 1931–35 and its fourth national historian 1939–41. In 1936 she was a co-founder of the Tennessee Valley Mathematics Association for high school teachers, junior college teachers, and others interested in mathematics. She served as secretary-treasurer of the mathematics division of the Alabama Education Association 1936–37.

Wyant was a Methodist and was a member of the Order of the Eastern Star. In about 1940 she listed her hobbies as supervising mathematics fraternity work and driving her car.

She also indicated that her favorite recreation was "playing with cocker spaniel" (AmWom 1935–40).

In 1940 Wyant was living in Birmingham, Alabama; she was living outside of Athens, Alabama, at the time of her death at age forty-five in 1942. The death certificate indicates only that she died of natural causes. She is buried in Ipava, Illinois, the town of her birth.

Organizational affiliations: AMS, MAA, Sigma Delta Epsilon, Sigma Xi, Pi Mu Epsilon, Kappa Mu Epsilon.

Thesis and dissertation:
1922 The measurement of the frequencies of oscillatory electrical circuits. MA thesis, University of Missouri. Typescript.
1929 The ideals in the algebra of generalized quaternions over the field of rational numbers. PhD dissertation, University of Missouri, directed by Gustav Eric Wahlin. Typescript. Printed version, 1939, Edwards Brothers, Ann Arbor, MI.

Abstracts:
1927 Some mathematical questions in Missouri history. *Amer. Math. Monthly* 34:3–4 #4. Presented to the MAA, Kansas City, MO, 13 Nov 1926. Printed version of typescript of presentation, "Some mathematical problems in Missouri history," 1939, Edwards Brothers, Ann Arbor, MI.
1928 The foundation of the theory of ideals. *Amer. Math. Monthly* 35:52 #1. Presented to a meeting of the MAA, St. Louis, MO, 25–26 Nov 1927.
1930 The ideals in the algebra of generalized quaternions over the field of rational numbers. *Bull. Amer. Math. Soc.* 36:204 #141. Presented to the AMS, Des Moines, IA, 30 Dec 1929. Based on PhD dissertation.

References to: AmMSc 5–6, AmWom 1935–40.

Other sources: PhD dissertation vita 1929; Owens questionnaires 1937, 1940; Owens Papers; communication with Athens College Archives; Mary S. Elick, "Brief History of Kappa Mu Epsilon,"; US Census 1900 IL, 1910, 1920, 1930 MO; Alabama death certificate.

Last modified: March 11, 2009.

YEATON, Marie M. (Johnson). March 1, 1898–March 19, 1978.
Knox College (BA 1920), University of Iowa (MS 1921), University of Chicago (PhD 1928).

Marie Mathilda Johnson was born in Galesburg, Illinois, the younger of two children of Ellen (Olson), born in 1867, and Oscar William Johnson, born in 1866, both natives of Illinois. Her parents married in 1890, and her brother, Eugene R., was born in September 1892. Her father was proprietor of a grocery store. Marie Johnson attended grammar school and high school in Galesburg, where the family lived.

Johnson attended Knox College, also in Galesburg, where Helen Calkins, BA Knox College 1916, was instructor of mathematics 1918–20, and Sally Elizabeth Carlson, MA University of Minnesota 1918, was instructor of mathematics and physics 1919–20. Johnson received her BA in 1920 and eight years later became that school's first graduate to receive a PhD in mathematics (Calkins did not receive her Cornell PhD until 1932). Johnson studied with H. L. Rietz and E. W. Chittenden at the University of Iowa 1920–21 and received her master's degree in 1921 with a major in mathematics and a minor in education.

In 1921 Johnson became an instructor at Lake Forest College in Lake Forest, Illinois. During the summers of 1922 through 1926 she attended the University of Chicago. Her last year at Lake Forest, 1925–26, she was assistant professor and acting head of the department. After leaving Lake Forest she held a fellowship at the University of Chicago for the year 1926–27 before receiving her doctorate in 1928 having written a dissertation in the calculus of variations.

In 1927 Johnson accepted an instructorship at Pennsylvania State College but was released from that contract in order to go to Oberlin College in Ohio as an acting assistant professor replacing Mary E. Sinclair who was on leave at the University of Miami in Coral Gables. Johnson's position became permanent, and she was assistant professor 1928 until 1943, when she was promoted to associate professor. She had a leave of absence during the academic year 1937–38 and spent the year in residence at the Institute for Advanced Study in Princeton.

In the fall of 1935, shortly after the MAA formed its Committee on Tests with one woman member, Clara E. Smith, professor emeritus at Wellesley, Johnson was added to the committee in order "to assist in the secretarial work of the committee and in the construction of tests" ("Report of the Committee on Tests" 1940, 290). The report of the committee specifically acknowledged Johnson's contributions in preparing the 1936 tests as well as in compiling questions for the tests for junior college mathematics and for trigonometry.

On October 27, 1943, Marie Johnson married Chester Henry Yeaton (1886–1970) who had come to Oberlin as an assistant professor of mathematics in 1921. Chester H. Yeaton was born in Maine and received his bachelor's degree at Bowdoin College in 1908. He received his master's degree at Harvard in 1909 and his PhD at Chicago in 1915 under the direction of E. J. Wilczynski. In 1923 Chester H. Yeaton had married Ethel May Kitch, who held a PhD from Chicago and was on the faculty of Oberlin's psychology and philosophy departments before she died in May 1941.

At the time of his marriage to Marie M. Johnson, Chester H. Yeaton was professor of mathematics. Marie Johnson Yeaton formally resigned from the Oberlin faculty effective March 1, 1944. In November 1944 she was appointed acting associate professor for the winter term. She held the position again in the second semester of 1951–52, after which Chester H. Yeaton retired. He died in Oberlin in 1970 at age eighty-three.

After her marriage Marie M. Yeaton continued her membership in the Oberlin Mathematics Club. She had previously served as faculty advisor to the club and in 1940 contributed bibliographies on "Nomographs" (with Dale Leipper) and "Constructions with

compasses alone" to a section on club topics in the *Monthly* (47:106–7). Yeaton was also a member of the Oberlin Social Science Club, and for two years she served as the president of the Beta Gamma chapter of Delta Kappa Gamma, an education honorary society. In the mid-1940s she was treasurer of the Oberlin branch of the AAUW. In 1939 she reported that she was a Lutheran and a Republican and listed her favorite hobby as photography and her favorite recreation as swimming. In the 1960s she was a member of the Button Club of Wellington.

Marie Yeaton died in Allen Memorial Hospital in Oberlin, Ohio, at age eighty, having been a resident at the Welcome Nursing Home for the previous five years. Her only survivor was Evelyn Yeaton, a sister-in-law living in Elyria, Ohio, about ten miles from Oberlin. Yeaton was buried in Westwood Cemetery in Oberlin.

Organizational affiliations: AMS, MAA, Sigma Xi, AAUW.

Thesis and dissertation:

1921 [Johnson, M. M.] The generalized mean value function. MS thesis, University of Iowa.

1928 [Johnson, M. M.] Tensors of the calculus of variations. PhD dissertation, University of Chicago, directed by Gilbert Ames Bliss. Typescript. Abstract: *University of Chicago. Abstracts of theses. Science series* 7:33-41. See also **1931**.

Publications:

1930 [Johnson, M. M.] Two discontinuous functions. *Amer. Math. Monthly* 37:497.

1931 [Johnson, M. M.] Tensors of the calculus of variations. *Amer. J. Math.* 53:103–16. Published version of PhD dissertation. Reviews: *JFM* 57.0599.02 (M. Pinl); *Zbl* 001.06903 (A. Duschek). Presented to the AMS, Cincinnati, OH, 1 Dec 1928; abstract: *Bull. Amer. Math. Soc.* 35:152–53 #8.

1937 [Johnson, M. M.] Review of *Functions of Real Variables*, by W. F. Osgood. *Natl. Math. Mag.* 12:153–54.

1940 [Johnson, M. M.] An extension of a covariant differentiation process. *Bull. Amer. Math. Soc.* 46:269–71. Reviews: *JFM* 66.1332.01 (K. H. Weise); *MR* 1,273e (N. Coburn); *Zbl* 024.35504 (St. Golab). Presented to the AMS, Chicago, 15 Apr 1939; abstract: *Bull. Amer. Math. Soc.* 45:365 #193.

1941 [Johnsons, M. M.] Review of *Living Mathematics*, by R. S. Underwood and F. W. Sparks. *Natl. Math. Mag.* 15:263.

1942a [Johnson, M.] Review of *Maxima and Minima of Functions of Two or More Variables*, by D. R. Curtis, Mathematical Monographs, ed. D. R. Curtis. *Amer. Math. Monthly* 49:539–40.

1942b [Johnson, M.] Review of *Spectra of Quadratic Forms in Infinitely Many Variables*, by E. D. Hellinger, Mathematical Monographs, ed. D. R. Curtis. *Amer. Math. Monthly* 49:541–42.

1942c [Johnson, M.] Review of *The Statistics of Time Series*, by H. T. Davis, Mathematical Monographs, ed. D. R. Curtis. *Amer. Math. Monthly* 49:540.

1942d [Johnson, M.] Review of *Topics in Continued Fractions and Summability*, by H. L. Garabedian and H. S. Wall, Mathematical Monographs, ed. D. R. Curtis. *Amer. Math. Monthly* 19:540–41.

1943a [Johnson, M. M.] Review of *Analytical Geometry*, by C. H. Lehmann. *Natl. Math. Mag.* 17:280.

1943b [Johnson, M. M.] Review of *Plane and Spherical Trigonometry*, by P. R. Rider. *Amer. Math. Monthly* 50:194–95.

References to: AmMSc 5–8, 9P; AmWom 1935–40.

"Prof. Yeaton, Miss Johnson Are Married." *Oberlin News-Tribune*, 4 Nov 1943.

"Mrs. Marie Johnson Yeaton Will Retire on March 1." *Oberlin News-Tribune*, 17 Feb 1944.

"Mrs. Chester Yeaton." (Obituary) *Oberlin News-Tribune*, 23 Mar 1978.

Other sources: PhD dissertation vita 1928; Owens questionnaire 1937; communications with Knox College Archives, Oberlin College Alumni Association, and University of Iowa Library; "Report of the Committee on Tests," *Amer. Math. Monthly* 47 (1940): 290–301; US Census 1900, 1910, 1920, 1930 IL.

Last modified: June 23, 2011.

YOUNG, Mabel M. July 18, 1872–March 4, 1963.
Wellesley College (BA 1898), Columbia University (Teachers College) (MA 1899), Johns Hopkins University (PhD 1914).

Mabel Minerva Young was born in Worcester, Massachusetts, the daughter of Minerva (Tyler) (1847–1894) and Willie C. Young (1847–1909), both of Massachusetts. Her mother graduated from the Oread Institute, a private school and college for girls and women in Worcester, before her marriage in 1871. She was later described as musical. In 1880 the Youngs and their two daughters, Mabel, age seven, and Edith, age two, were living in Worcester with Willie Young's parents. Willie Young was a machinist and bookkeeper and later president of the W. C. Young Manufacturing Company that made machinists' tools. He was chairman of the school committee at the time of his wife's death and was a Republican member of the Massachusetts state legislature in 1896 and 1897. He remarried in 1897. Edith C. Young was in the Wellesley College class of 1900.

Mabel Young attended public schools in Worcester for her primary and secondary education. For the latter she completed a five-year course at Classical High School, from which she graduated as salutatorian. It was observed in a 1941 article in the *Wellesley Alumnae Magazine* that when she entered Wellesley College in 1894 she was unusually well prepared, especially in Greek, Latin, and mathematics, and that she had already decided on mathematics thanks to an excellent high school teacher.

During her four years at Wellesley, Young studied mainly English, mathematics, philosophy, and psychology before receiving her bachelor's degree in 1898. She spent the next year, 1898–99, at Columbia University, where she did work in education and psychology and earned her MA and a master's diploma in education from Teachers College, Columbia, in 1899.

Young taught in schools 1899–1904. In particular, from 1899 to 1902, she taught mainly English at the Northfield Seminary, a girls' preparatory school in Massachusetts. In 1904 she returned to Wellesley as an assistant in mathematics and was made an instructor in 1906. In 1904–08 she was enrolled in three hours a week of graduate courses in pure mathematics at Wellesley. At the same time, she was teaching one or two freshman sections each semester. Young did graduate work at Cornell University during the summer of 1908.

Young applied for admission to the Johns Hopkins University in the fall of 1909, was accepted, and was in residence there 1909–10 and again 1912–14, while she had leaves of absence from Wellesley 1909–11 and 1912–14. She was a fellow by courtesy at Johns Hopkins, with remission of tuition fees, 1913–14. Her dissertation in algebraic geometry was directed by Frank Morley. Morley and Abraham Cohen signed the recommendation for its acceptance on May 30, 1914: "The problem is solved completely; and the work is done carefully and understandingly. The style shows a cautious and critical New England intelligence" (Student files, Ferdinand Hamburger Archives, The Johns Hopkins University). Young received her doctorate in 1914 with physics as a first subordinate subject.

The remainder of Young's career was spent at Wellesley. She remained an instructor until 1919; she was assistant professor 1919–24, associate professor 1924–30, professor 1930–41, and emeritus professor after her retirement in 1941. During the year 1930–31 she traveled for six months in the Mediterranean region while on a leave of absence for study and travel.

Young was a charter member of the MAA and served on the arrangements committee for the first summer meeting of the MAA that was held at MIT in September 1916. Two years later she and Helen Merrill, then chairman of the department at Wellesley, prepared the index for the 1918 volume of the *Monthly*. From the early 1920s through the early 1930s, Young was also a regular contributor of problems and solutions to the *Monthly*.

In 1932 Helen Merrill retired from Wellesley and the department chairmanship that she had held for sixteen years. The following year Young became department chairman and

remained so until her retirement. She was the Lewis Atterbury Stimson professor for some years. Her teaching at Wellesley included primarily geometry and statistics, although she preferred the theoretical to the more applied work.

Young's interests included music and travel. In addition to that noted above, she traveled in France and Germany in the summer of 1922 and in Norway and Sweden in the summer of 1936 when she attended the International Congress of Mathematicians in Oslo. In about 1940 she described herself as Congregational and a Republican. After her death in 1963 at age ninety in a nursing home in Wellesley, memorial services were held at the chapel on the Wellesley College campus.

Organizational affiliations: AMS, MAA (charter member), ASA, Hist. Sci. Soc., AAAS, AAUP, Phi Beta Kappa, Sigma Xi.

Thesis and dissertation:
1899 The aims and methods of the teaching of mathematics in the secondary schools of Germany and the United States. MA thesis, Columbia University.
1914 Dupin's cyclide as a self-dual surface. PhD dissertation, Johns Hopkins University, directed by Frank Morley. Printed version, 1916, reprinted from *Amer. J. Math.* 38:267–86.

Publications:
1916 Dupin's cyclide as a self-dual surface. *Amer. J. Math.* 38:267–86. Published version of PhD dissertation. Reviews: *JFM* (W. Fr. Meyer) 46:998–99; *Rev. semestr. publ. math.* 25, pt. 1: 6 (E. B. Cowley).
1932 Helen Abbot Merrill. *Wellesley Alumnae Magazine* 16:405–6.
1933 Curves arising from a single infinity of triangles. *Amer. Math. Monthly* 40:196–202. Review: *JFM* 59.0589.01 (M. Zacharias).
1949 with H. G. Russell and M. Stark. Helen A. Merrill, '86. *Wellesley Alumnae Magazine* 33:353–54.

References to: AmMSc 5–8, 9P; AmWom 1935–40; BiDWSci.
"Mabel Minerva Young," *Wellesley Alumnae Magazine* (June 1941).
"Mabel Minerva Young," (obituary) *Wellesley Alumnae Magazine* (May 1963).

Other sources: PhD dissertation vita 1914; Owens questionnaire 1937; Ferdinand Hamburger Archives, The Johns Hopkins University; "Death of Mrs. Willie C. Young," *Worcester Daily Telegram*, 22 Aug 1894; US Census 1880, 1900, 1930 MA.

Last modified: March 11, 2009.

List of Names of Women in the Study

Given first names that were rarely used are in parentheses.

Adams, Helen Mary Schlauch, *see* Infeld
Adams, Rachel Blodgett
Aitchison, Beatrice
Alden, Marjorie Leffler
Alderton, Nina May, *see* Moore
Allen, Bess Marie Eversull
Allen, Florence Eliza
Ames, Vera Adela, *see* Widder
Anderson, Mae Ruth
Anderson, Nola Lee, *see* Haynes
Anderson, R(ose) Lucile
Anderton, Ethel Louise
Andrews, Annie Dale Biddle
Andrews, Grace
Armstrong, Beulah May
Arnoldy, Catherine Helen, *see* Arnoldy, Sr.
Arnoldy, Sister Mary Nicholas

Babcock, Wealthy Consuelo
Bacon, Clara Latimer
Baker, Frances Ellen
Ballantine, Constance Juliet Rummons
Ballard, Ruth Glidden Mason
Bareis, Grace Marie
Barnes, Mabel Frances Schmeiser
Barney, Ida
Barnum, Charlotte Cynthia
Barton, (Martha) Helen
Baxter, Agnes Sime, *see* Hill, A. B.
Baxter, (Margaret) Elizabeth Pillsbury
Beaty, Marjorie Louise Heckel
Bechtolsheim, Lulu Hofmann
Becker, Miriam Freda, *see* Mazur
Beenken, May Margaret
Benedict, Suzan Rose
Bennett, Elizabeth Ruth, *see* Grennan
Bernstein, Dorothy Lewis
Biddle, Annie Dale, *see* Andrews, A. D. B.
Black, Florence Lucile
Blanch, Gertrude
Blodgett, Rachel, *see* Adams
Bonner, Harriet Rees
Bosworth, Anne Lucy, *see* Focke
Bower, Julia Wells
Boyce, Fannie Wilson
Brady, Dorothy Elizabeth Stahl
Brahdy, Mina Spiegel Rees, *see* Rees, M. S.
Brewster, Helen Barten, *see* Owens
Brown, Eleanor Pairman
Buchanan, Margaret, *see* Cole, M. B.
Buck, Elsie Jeannette McFarland
Burke, Ethel Louise, *see* Burke, Sr.
Burke, Sister Leonarda
Burns, Josephine Elizabeth, *see* Glasgow
Bushey, Jewell Constance Hughes

Calkins, Helen
Carlson, (Sally) Elizabeth
Carroll, Evelyn Teresa, *see* Rusk
Carroll-Rusk, Evelyn Teresa, *see* Rusk
Casner, Evelyn Prescott Wiggin
Chandler, Emily McCoy, *see* Pixley
Chanler, Josephine Hughes
Coddington, Emily Matilda, *see* Williams, E. C.
Cohen, Teresa
Cole, Margaret Buchanan
Cole, Nancy
Collier, Myrtie
Colpitts, Julia Trueman
Cooper, Elizabeth Morgan
Cope, (Elizabeth) Frances Thorndike
Copeland, Lennie Phoebe
Cowley, Elizabeth Buchanan
Crathorne, Charlotte Elvira Pengra
Cronin, Sarah Elizabeth
Cummings, Louise Duffield
Curtis, Mary Florence, *see* Graustein

Dale, Julia May
Darkow, Marguerite Daisy
Dean, Mildred Caroline Somerset Waters
Delevie, Jeanette Fox Keston
Dickerman, Elizabeth Street
Dimick, Alice Madeleine McKelden

Early, Madeline Levin
Edgerton, Winifred Haring, *see* Merrill, W. E.
Epstein, Marion Belle Greenebaum
Eversull, Bess Marie, *see* Allen, B. E.

Farnum, (Eugenia) Fae [later Fay]
Fitch, Annie Louise MacKinnon
Focke, Anne Lucy Bosworth
Fowler, Josephine, *see* Fowler, Sr.
Fowler, Sister Mary Charlotte
Fox, Jeanette, *see* Delevie

Franklin, Christine Ladd, *see* Ladd-Franklin
Frink, Aline Huke
Fry, Cleota Gage

Galvin, Joanna, *see* Galvin, Sr.
Galvin, Sister Catharine Francis
Garvin, Linetta Anna, *see* Garvin, Sr.
Garvin, Sister Mary Cleophas
Gentry, Ruth Ellen
Gibbens, Gladys Elizabeth Corson
Glasgow, Josephine Elizabeth Burns
Gough, Margaret, *see* Gough, Sr.
Gough, Sister Mary de Lellis
Grant, Anna Margaret Catherine
Graustein, Mary Florence Curtis
Gray, Alta Harriet Odoms
Gray, Marion Cameron
Greenebaum, Marion Belle, *see* Epstein
Greenfield, Bella Manel Shiffman Kotkin
Grennan, Elizabeth Ruth Bennett
Griffin, Harriet Madeline
Griffin, Mabel Jeanette, *see* Reavis
Griffiths, Lois Wilfred
Guggenbuhl, Laura
Gurney, Margaret

Haberzetle, Mary Barbara, *see* Turner, M. H.
Hagen, Beatrice Liberty
Haller, Mary Elizabeth
Harshbarger, Frances
Haseman, Mary Gertrude
Hathaway, Martha Eldora, *see* Williams, M. H.
Haynes, Nola Lee Anderson
Hazlett, Olive Clio
Heckel, Marjorie Louise, *see* Beaty
Hedberg, Marguerite Lenore Zeigel
Hennel, Cora Barbara
Henriques, Anna Adelaide Stafford
Hickey, (Deborah) May, *see* Maria
Hightower, Ruby Usher
Hill, Agnes Sime Baxter
Hill, Maria Anna, *see* Hill, Sr.
Hill, Sister Mary Laetitia
Hirschfelder, Elizabeth Thatcher Stafford Sokolnikoff
Hofmann, Lulu, *see* Bechtolsheim
Hopkins, Margarete Caroline Wolf
Hopper, Grace Brewster Murray
Horton, Goldie Printis, *see* Porter
Howe, Anna Mayme
Hsia, Shu Ting Liu
Hughes, Jewell Constance, *see* Bushey
Hughes, Olive Margaret
Huke, Aline, *see* Frink
Hull, Mary Shore Walker
Humphreys, M(abel) Gweneth
Hunt, Mildred
Huston, Antoinette Marie Killen

Infeld, Helen Mary Schlauch Adams
Irwin, Mayme, *see* Logsdon

Jackson, Rosa Lea
Jacobs, Jessie Marie, *see* Offermann
Jacobs-Muller, Jessie Marie, *see* Offermann
Johnson, Anna, *see* Wheeler
Johnson, (Laura) Louise, *see* Rosenbaum
Johnson, Marie Mathilda, *see* Yeaton
Johnson, Roberta Frances

Kaimowitz, Gittel, *see* Blanch
Kanarik, Rosella
Kanarik, Rosella Kanarik
Karl, Elizabeth E. Mary, *see* Karl, Sr.
Karl, Sister Mary Cordia
Kelley, Helen Agnes, *see* Kelley, Sr.
Kelley, Sister Mary Gervase
Kendall, Claribel
Kenny, Mary Virginia, *see* Landers
Keston, Jeanette Fox, *see* Delevie
Ketchum, Gertrude Stith
Killen, Antoinette Marie, *see* Huston
King, Eula Adeline Weeks
Kloyda, Sister M(ary) Thomas á Kempis
Kloyda, Sophia, *see* Kloyda, Sr.
Kohlmetz, Dorothy Bothwell
Kotkin, Bella Manel Shiffman, *see* Greenfield
Kramer, Edna Ernestine
Kramer-Lassar, Edna Ernestine, *see* Kramer

Ladd, Christine, *see* Ladd-Franklin
Ladd-Franklin, Christine
Landers, Mary Virginia Kenny
Larew, Gillie Aldah
Lassar, Edna Ernestine Kramer, *see* Kramer
Leffler, Marjorie, *see* Alden
Lehr, (Anna) Marguerite Marie
Lester, Caroline Avery
LeStourgeon, (Flora) Elizabeth
Levin, Madeline, *see* Early

Levine, Annita Tuller, *see* Tuller
Lewis, Florence Parthenia
Little, Dorothy Manning Smiley
Litzinger, Marie Paula
Liu, Shu Ting, *see* Hsia
Logsdon, Mayme Irwin

MacKinnon, Annie Louise, *see* Fitch
Maddison, (Ada) Isabel
Manel, Bella, *see* Greenfield
Mangold, Josephine Margaret, *see* Mangold, Sr.
Mangold, Sister Marie Cecilia
Manning, Dorothy, *see* Little
Maria, (Deborah) May Hickey
Martin, Emilie Norton
Mason, Ruth Glidden, *see* Ballard
Mauch, Margaret Evelyn
Mayer, Joanna Isabel
Mazur, Miriam Freda Becker
McCain, Gertrude Iona
McCormick, Esther Ober, *see* Torrance
McCoy, Dorothy
McDonald, Emma Kirtland Whiton
McFarland, Dora
McFarland, Elsie Jeannette, *see* Buck
McKee, Ruth Caroline Stauffer
McKelden, Alice Madeleine, *see* Dimick
McMillan, (Elizabeth) Audrey Wishard
Mears, Florence Marie
Merrill, Helen Abbot
Merrill, Winifred Haring Edgerton
Metcalf, Ida Martha
Miller, Bessie Irving
Modesitt, Virginia, *see* Reklis
Montague, Harriet Frances
Moody, Ethel Isabel
Moore, Nina May Alderton
Morenus, Eugenie Maria
Morrison, Rose Mary, *see* Morrison, Sr.
Morrison, Sister Charles Mary
Muller, Jessie Marie Jacobs, *see* Offermann
Mullikin, Anna Margaret
Murray, Grace Brewster, *see* Hopper

Nee, Henrietta Pearl Terry
Nelson, Sara Louise
Newson, Mary Frances Winston
Newton, Abba Verbeck
Noble, Andrewa Rebecca

O'Brien, Katharine Elizabeth
Odoms, Alta Harriet, *see* Gray, A. O.
Offermann, Jessie Marie Jacobs Muller
Olson, Emma Julia
Owens, Helen Barten Brewster

Pairman, Eleanor, *see* Brown
Peirce, Leona May
Pell, Anna Johnson, *see* Wheeler
Pence, Sallie Elizabeth
Pengra, Charlotte Elvira, *see* Crathorne
Pepper, Echo Delores
Peters, Ruth Margaret
Pillsbury, (Margaret) Elizabeth, *see* Baxter
Pixley, Emily McCoy Chandler
Plass, Martha Eldora Hathaway, *see* Williams, M. H.
Porter, Goldie Printis Horton
Price, Irene

Quinn, (Carolyn) Grace Shover

Ragsdale, Virginia
Rambo, Susan Miller
Rasmusen, Ruth Beatrice
Rayl, Adrienne Sophie
Reavis, Mabel Jeanette Griffin
Rees, Harriet, *see* Bonner
Rees, Mina Spiegel
Reilly, Margaret, *see* Reilly, Sr.
Reilly, Sister Mary Henrietta
Reklis, Virginia Modesitt
Robinson, Josephine Alberta, *see* Roe
Roe, Josephine Alberta Robinson
Rosenbaum, (Laura) Louise Johnson
Rummons, Constance Juliet, *see* Ballantine
Rusk, Evelyn Teresa Carroll
Russell, Helen Gertrude

Sagal, Mary Helen Sznyter
Sanderson, Mildred Leonora
Schlauch, Helen Mary, *see* Infeld
Schmeiser, Mabel Frances, *see* Barnes
Schoonmaker, Hazel Edith, *see* Wilson
Schulte, Catherine Mary, *see* Schulte, Sr.
Schulte, Sister M(ary) Leontius
Sedgewick, Rose Alice Whelan
Seely, Caroline Eustis
Shea, (Mary) Gertrude, *see* Shea, Sr.
Shea, Sister Ann Elizabeth
Shiffman, Bella Manel, *see* Greenfield
Shover, (Carolyn) Grace, *see* Quinn
Simond, Ruth Gertrude
Sinclair, Mary Emily
Sister Ann Elizabeth, *see* Shea, Sr.

Sister Catharine Francis, *see* Galvin, Sr.
Sister Charles Mary, *see* Morrison, Sr.
Sister Leonarda, *see* Burke, Sr.
Sister M(ary) Domitilla, *see* Thuener, Sr.
Sister M(ary) Helen, *see* Sullivan, Sr.
Sister M(ary) Leontius, *see* Schulte, Sr.
Sister M(ary) Thomas á Kempis, *see* Kloyda, Sr.
Sister Marie Cecilia, *see* Mangold, Sr.
Sister Mary Charlotte, *see* Fowler, Sr.
Sister Mary Cleophas, *see* Garvin, Sr.
Sister Mary Cordia, *see* Karl, Sr.
Sister Mary de Lellis, *see* Gough, Sr.
Sister Mary Felice, *see* Vaudreuil, Sr.
Sister Mary Gervase, *see* Kelley, Sr.
Sister Mary Henrietta, *see* Reilly, Sr.
Sister Mary Laetitia, *see* Hill, Sr.
Sister Mary Nicholas, *see* Arnoldy, Sr.
Smiley, Dorothy Manning, *see* Little
Smith, Clara Eliza
Sokolnikoff, Elizabeth Thatcher Stafford, *see* Hirschfelder
Speer, Mary Margaret Taylor
Spencer, Vivian Eberle
Sperry, Pauline
Stafford, Anna Adelaide, *see* Henriques
Stafford, Elizabeth Thatcher, *see* Hirschfelder
Stahl, Dorothy Elizabeth, *see* Brady
Stark, Marion Elizabeth
Stauffer, Ruth Caroline, *see* McKee
Stith, Gertrude, *see* Ketchum
Stokes, Ellen Clayton
Stokes, Ruth Wyckliffe
Sullivan, Mildred Marie
Sullivan, Monica Elizabeth, *see* Sullivan, Sr.
Sullivan, Sister M(ary) Helen
Sutton, Flora Dobler
Sznyter, Mary Helen, *see* Sagal

Tappan, (Anna) Helen
Taylor, Mary Margaret, *see* Speer
Taylor, Mildred Ellen
Terry, Henrietta Pearl, *see* Nee
Thorndike, (Elizabeth) Frances, *see* Cope
Thornton, Marian Augusta Wilder
Thuener, Eleanor Margaret, *see* Thuener, Sr.
Thuener, Sister M(ary) Domitilla
Torrance, Esther Ober McCormick
Torrey, Marian Marsh
Tuller, Annita
Turner, Bird Margaret
Turner, Mary Barbara Haberzetle

Van Benschoten, Anna Lavinia
Varnhorn, Mary Catherine
Vaudreuil, Annette, *see* Vaudreuil, Sr.
Vaudreuil, Sister Mary Felice
Vivian, Roxana Hayward

Walker, Mary Shore, *see* Hull
Waters, Mildred Caroline Somerset, *see* Dean
Weeks, Dorothy Walcott
Weeks, Eula Adeline, *see* King
Weiss, Marie Johanna
Wells, Mary Evelyn
Wheeler, Anna Johnson Pell
Whelan, A(nna) Marie
Whelan, Rose Alice, *see* Sedgewick
White, Marion Ballantyne
Whiton, Emma Kirtland, *see* McDonald
Widder, Vera Adela Ames
Wiggin, Evelyn Prescott, *see* Casner
Wilder, Marian Augusta, *see* Thornton
Williams, Emily Matilda Coddington
Williams, Martha Eldora Hathaway Plass
Wilson, Hazel Edith Schoonmaker
Winston, Mary Frances, *see* Newson
Wishard, (Elizabeth) Audrey, *see* McMillan
Wolf, Louise Adelaide
Wolf, Margarete Caroline, *see* Hopkins
Wood, Ruth Goulding
Worthington, Euphemia Richardson
Wyant, (Emily) Kathryn

Yeaton, Marie Mathilda Johnson
Young, Mabel Minerva

Zeigel, Marguerite Lenore, *see* Hedberg

Selected Bibliography

Albisetti, James C. *Schooling German Girls and Women: Secondary and Higher Education in the Nineteenth Century.* Princeton, NJ: Princeton University Press, 1988.

American Mathematical Society. *Semicentennial Addresses of the American Mathematical Society.* Providence, RI: American Mathematical Society, 1938. Reprint, New York: Arno Press, 1980, and Providence, RI: American Mathematical Society, 1988.

Archibald, Raymond Clare. *A Semicentennial History of the American Mathematical Society 1888–1938.* Providence, RI: American Mathematical Society, 1938. Reprint, New York: Arno Press, 1980, and Providence, RI: American Mathematical Society, 1988.

Barnes, Mabel S., Judy Green, Jeanne LaDuke, Vivienne Malone-Mayes, and Olga Taussky-Todd. "Centennial Reflections on Women in American Mathematics." *AWM Newsletter* 18, no. 6 (1988): 4–12.

Bell, E. T. "Fifty Years of Algebra in America, 1888–1938." In *Semicentennial Addresses of the American Mathematical Society*, 1–34.

Bernstein, Dorothy L., M. Gweneth Humphreys, Anne F. O'Neill, and Mina Rees. "Women Mathematicians before 1950." *AWM Newsletter* 9 no. 4 (1979): 9–18.

Case, Bettye Anne, and Anne M. Leggett. *Complexities: Women in Mathematics.* Princeton, NJ: Princeton University Press, 2005.

Cockey, Beale W. "Mathematics at Goucher: 1888–1979." Goucher College, 1979.

Duren, Peter, ed. *A Century of Mathematics in America,* 3 pts. Providence, RI: American Mathematical Society, 1988–89.

Fenster, Della Dumbaugh, and Karen Hunger Parshall. "Women in the American Mathematical Research Community: 1891–1906." In *The History of Modern Mathematics. Volume III: Images, Ideas, and Communities*, edited by David E. Rowe and Eberhard Knobloch, 229–61. Boston, MA: Academic Press, 1994.

Green, Judy, and Jeanne LaDuke. "Women in American Mathematics: A Century of Contributions." In *A Century of Mathematics in America*, Part 2, edited by Peter Duren, with the assistance of Richard A. Askey and Uta C. Merzbach, 379–98.

Green, Judy, and Jeanne LaDuke. "Women in the American Mathematical Community: The Pre-1940 Ph.D.'s." *Mathematical Intelligencer* 9, no. 1 (1987): 11–23.

Green, Judy, and Jeanne LaDuke. "Contributors to American Mathematics: An Overview and Selection." In *Women of Science: Righting the Record*, edited by G. Kass-Simon and Patricia Farnes, 117–46. Bloomington: Indiana University Press, 1990.

Grinstein, Louise S. "Some 'Forgotten' Women of Mathematics: A Who Was Who." *Philosophia Mathematica* 13/14 (1976/77): 73–78.

Grinstein, Louise S. *Mathematical Book Review Index, 1800-1940.* New York: Garland Publishing, 1992.

Grinstein, Louise S., and Paul J. Campbell, eds. *Women of Mathematics: A Biobibliographic Sourcebook.* Westport, CT: Greenwood Press, 1987.

Jones, Burton W., and Wolfgang J. Thron. "A History of the Mathematics Departments of the University of Colorado." Boulder, CO: 1979.

Kenschaft, Patricia C. "The Students of Charlotte Angas Scott." *Mathematics in College* (1982): 16–20.

King, Amy. "Women Ph.D.'s in Mathematics in USA and Canada: 1886–1973." *Philosophia Mathematica* 13/14 (1976/77): 79–129.

Lewis, Albert C. "The Building of the University of Texas Mathematics Faculty, 1883–1938." In *A Century of Mathematics in America*, Part 3, edited by Peter Duren, with the assistance of Richard A. Askey, Uta C. Merzbach, and Harold M. Edwards, 205–39.

Maltby, Margaret E. *History of the Fellowships Awarded by the American Association of University Women, 1888–1929, With Vitas of the Fellows.* New York: Columbia University Press, 1929.

Moore, Calvin C. *Mathematics at Berkeley: A History*. Wellesley, MA: A. K. Peters, 2007.

Mullaly, Sister Columba. *Trinity College, Washington, D.C.: The First Eighty Years 1897–1977*. Westminster, MD: Christian Classics, Inc., 1987.

Murray, Margaret A. M. *Women Becoming Mathematicians: Creating a Professional Identity in Post-World War II America*. Cambridge, MA: MIT Press, 2000.

Parshall, Karen Hunger, and David E. Rowe. *The Emergence of the American Mathematical Research Community, 1876–1900: J. J. Sylvester, Felix Klein, and E. H. Moore*, volume 8 of *History of Mathematics*. Providence, RI: American Mathematical Society, 1994.

Price, G. Baley. *History of the Department of Mathematics of the University of Kansas, 1866–1970*. Lawrence, KS: Kansas University Endowment Association, University of Kansas, 1976.

Rossiter, Margaret W. *Women Scientists in America: Struggles and Strategies to 1940*. Baltimore, MD: Johns Hopkins University Press, 1982.

Rossiter, Margaret W. *Women Scientists in America: Before Affirmative Action 1940–1972*. Baltimore, MD: Johns Hopkins University Press, 1995.

Singer, Sandra L. *Adventures Abroad: North American Women at German-Speaking Universities, 1868–1915*. Westport, CT: Praeger Publishers, 2003.

Srinivasan, Bhama, and Judith D. Sally, eds. *Emmy Noether in Bryn Mawr*. New York: Springer-Verlag, 1983.

Stanford, Edna Cleo. "The History of the Mathematics Department at the University of Illinois." MA thesis, University of Illinois, 1940.

Tobies, Renate. "Mathematikerinnen und ihre Doktorväter." In *Aller Männerkultur zum Trotz: Frauen in Mathematik und Naturwissenschaften*, edited by Renate Tobies, 131–58.

Tobies, Renate. "Zum Beginn des mathematischen Frauenstudiums in Preussen." *NTM: Schriftenreihe für Geschichte der Naturwissenschaften, Technik und Medizin.* (1991/92): 151–72.

Tobies, Renate, ed. *Aller Männerkultur zum Trotz: Frauen in Mathematik und Naturwissenschaften*. Frankfurt, Germany: Campus Verlag, 1997.

Whitman, Betsey S. "Women in the American Mathematical Society before 1900." *AWM Newsletter* Part 1. 13, no. 4 (July-Aug. 1983): 10–14. Part 2. 13, no. 5 (Sept.-Oct. 1983): 7–9. Part 3. 13, no. 6 (Nov.-Dec. 1983): 9–12.

Williams, Kathleen Broome. *Improbable Warriors: Women Scientists and the U.S. Navy in World War II*. Annapolis, MD: Naval Institute Press, 2001.

List of Abbreviations

In many instances, abbreviations of items in the "References to" section of the entries are those used in the Biography and Genealogy Master Index (BGMI), Farmington Hills, MI: Gale, Cengage Learning, 1980–2009. Full bibliographic information is given only for those book sources that are not serial publications. Abbreviations for most journals are usually self evident and are not included below. Abbreviations used for mathematics journals are found in *Mathematical Reviews* (*MR*).

AAAS	American Association for the Advancement of Science
AAUP	American Association of University Professors
AAUW	American Association of University Women
ACA	Association of Collegiate Alumnae
AmArch	*American Architects Directory*
AmMSc	*American Men of Science*
AmMWSc	*American Men and Women of Science*
AmNatBi	*American National Biography*. 24 volumes. Edited by John A. Garraty and Mark C. Carnes. New York: Oxford University Press, 1999.
AMS	American Mathematical Society
AmWom 1935–40	*American Women 1935–1940: A composite biographical dictionary*. By Durwood Howes. Detroit, MI: Gale Research Co., 1981.
AmWomSc	*American Women in Science: A biographical dictionary*. By Martha J. Bailey. Denver: ABC-CLIO, 1994.
AmWomTe	*American Women in Technology: An encyclopedia*. By Linda Zierdt-Warshaw, Alan Winkler, and Leonard Bernstein. Santa Barbara, CA: ABC-CLIO, 2000.
AWM	Association for Women in Mathematics
ASA	American Statistical Association
AZWoSci	*A to Z of Women in Science and Math*. By Lisa Yount. New York: Facts on File, 1999.
BiCAW	*The Biographical Cyclopaedia of American Women*. Two volumes. Detroit: Gale Research, 1974.
BiDAmEd	*Biographical Dictionary of American Educators*. Three volumes. Edited by John F. Ohles. Westport, CT: Greenwood Press, 1978.
BiDPsy	*Biographical Dictionary of Psychology*. By Leonard Zusne. Westport, CT: Greenwood Press, 1984.
BiDcPsy	*Biographical Dictionary of Psychology*. Edited by Noel Sheehy, Antony J. Chapman, Wendy A. Conroy. London: Routledge, 1997.
BiDWSci	*The Biographical Dictionary of Women in Science: Pioneering lives from ancient times to the mid-20th century*. Edited by Marilyn Ogilvie and Joy Harvey. New York: Routledge, 2000.
BiDSci	*The Biographical Dictionary of Scientists*. Edited by Roy Porter, 2nd ed., New York: Oxford University Press, 1994.
BioWMath	Biographies of Women Mathematicians
CamDcAB	*The Cambridge Dictionary of American Biography*. Edited by John S. Bowman. Cambridge, England: Cambridge University Press, 1995.
ConAmC	*Contemporary American Composers: A biographical dictionary*. Compiled by E. Ruth Anderson. Boston: G.K. Hall & Co., 1976, 1982.
ConAu	*Contemporary Authors*
CurBio	*Current Biography Yearbook*
DcAmB	*Dictionary of American Biography*. Volumes 1-20. New York: Charles Scribner's Sons, 1928-1936.

DcCanB	*Dictionary of Canadian Biography*. Volume XIV: 1911 to 1920. Edited by Ramsay Cook. Toronto: University of Toronto Press, 1998.
DcMAP	*The Dictionary of Modern American Philosophers*. Four volumes. Edited by John R. Shook. Bristol, England: Thoemmes Continuum, 2005.
DcNAA	*A Dictionary of North American Authors Deceased before 1950*. Compiled by W. Stewart Wallace. Toronto: Ryerson Press, 1951.
DcWomW	*Dictionary of Women Worldwide: 25,000 Women through the Ages*. Edited by Anne Commire. Waterford, CT: Yorkin Publications, 2007.
EncAB-A	*Encyclopedia of American Biography*. New Series. New York: American Historical Society, 1967.
EncWB	*Encyclopedia of World Biography*
HisDcDP	*Historical Dictionary of Data Processing: Biographies*. By James W. Cortada. New York: Greenwood Press, 1987.
InSci	*Index to Scientists of the World from Ancient to Modern Times: Biographies and portraits*. By Norma Olin Ireland. Boston: F.W. Faxon Co., 1962.
IntWW	*The International Who's Who*
IntWWM	*International Who's Who in Music and Musicians' Directory*
IntWWP	*International Who's Who in Poetry*
InWom	*Index to Women of the World from Ancient to Modern Times: Biographies and portraits*. By Norma Olin Ireland. Westwood, MA: F.W. Faxon Co., 1970.
InWom SUP	*Index to Women of the World from Ancient to Modern Times: A supplement*. By Norma Olin Ireland. Metuchen, NJ: Scarecrow Press, 1988.
JFM	*Jahrbuch über the Fortschritte der Mathematik*
LAmSci	*Leaders in American Science*
LEduc	*Leaders in Education*
MacTutor	MacTutor History of Mathematics Archive (Female mathematicians)
MR	*Mathematical Reviews*
NatCAB	*National Cyclopaedia of American Biography*
NotMat	*Notable Mathematicians: From ancient times to the present*. Detroit: Gale Research, 1998.
NotSci	*Notable Scientists from 1900 to the Present*. Five volumes. Detroit: Gale Group, 2001. Earlier editions published as *Notable Twentieth-Century Scientists*.
NotTwCS	*Notable Twentieth-Century Scientists*. Four volumes. Detroit: Gale Research, 1995.
NotWoMa	*Notable Women in Mathematics: A biographical dictionary*. Edited by Charlene Morrow and Teri Perl. Westport, CT: Greenwood Press, 1998.
NotWoPS	*Notable Women in the Physical Sciences: A biographical dictionary*. Edited by Benjamin F. Shearer and Barbara S. Shearer. Westport, CT: Greenwood Press, 1997.
NotWoSc	*Notable Women Scientists*. Detroit: Gale Group, 1999.
OhA&B	*Ohio Authors and Their Books. Biographical data and selective bibliographies for Ohio authors, native and resident, 1796-1950*. Edited by William Coyle. Cleveland: World Publishing Co., 1962.
OutEdAm	*Outstanding Educators of America*

PeoHis	*People in History: An index to U.S. and Canadian biographies in history journals and dissertations*. Two volumes. Edited by Susan K. Kinnell. Santa Barbara, CA: ABC-CLIO, 1988.
Poggendorff	*J.C. Poggendorffs biographisch-literarisches Handwrterbuch zur Geschichte der exacten Wissenschaften*
Sc&ItsT	*Science and Its Times: Understanding the social significance of scientific discovery*. Detroit: Gale Group 2000.
SSDI	Social Security Death Index
TwCBDA	*The Twentieth Century Biographical Dictionary of Notable Americans*. Ten volumes. Edited by Rossiter Johnson. Boston: The Biographical Society, 1904.
WhAm	*Who Was Who in America*
WhoAm	*Who's Who in America*
WhoAmEd	*Who's Who in American Education*
WhoAmW	*Who's Who of American Women*
WhoE	*Who's Who in the East*. Marquis Who's Who.
WhoEast 1930	*Who's Who in the East*. Washington, DC: Mayflower Pub. Co., 1930.
WhoGov	*Who's Who in Government*. Marquis Who's Who.
WhoMedi	*Who's Who in the Media and Communications*
WhoMW	*Who's Who in the Midwest*
WhoRel	*Who's Who in Religion*
WhoScEn	*Who's Who in Science and Engineering*
WhoSSW	*Who's Who in the South and Southwest*
WhoWest	*Who's Who in the West*
WhoWor	*Who's Who in the World*
WhoWorJ	*Who's Who in World Jewry: A biographical dictionary of outstanding Jews*
WomFir	*Women's Firsts*. Edited by Caroline Zilboorg. Detroit: Gale Research, 1997.
WomSc	*Women in Science: Antiquity through the nineteenth century*. By Marilyn Bailey Ogilvie. Cambridge, MA: MIT Press, 1986.
WomScSearch	*Women in the Scientific Search: An American bio-bibliography, 1724–1979*. By Patricia Joan Siegel and Kay Thomas Finley. Metuchen, NJ: Scarecrow Press, 1985.
WomWorHis	*Women in World History: A biographical encyclopedia*. Seventeen volumes. Waterford, CT: Yorkin Publications, 1999-2002.
WomWWA	*Woman's Who's Who of America: A biographical dictionary of contemporary women of the United States and Canada, 1914-1915*. Edited by John William Leonard. New York: American Commonwealth Co., 1914.
WorWhoW	*The World Who's Who of Women*
WPA	Works Progress Administration (1935–39); Work Projects Administration (1939–42)
Zbl	*ZentralBlatt für Mathematik*