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.
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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.

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