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(b. Bergzabern Germany 12 May 1857; d. Freiberg im Breisgau Germany 5 July 1942)

mathematics.

Bolza's principal mathematical investigations covered three topics: the reduction of hyperelliptic, and the calculus of variations. On the first two topics Bolza proved an able follower of his teachers Karl Weierstrass and [Felix Klein](#). In the realm of reduction problems he worked chiefly on third-degree and fourth degree transformations. He stressed elliptic theory and often reformulated it as a special elliptic theory and often reformulated it as a special case of the hyper elliptic theory in his papers on hyper elliptic θ and ζ functions. On the third topic his book *Lectures on the Calculus of Variations* (1904) presented the most recent contributions of Weierstrass Adolf Kneser and [David Hilbert](#) as well as his own comments. In this book and other writings he addressed the theory in the plane and the problem of Lagrange with fixed end points. He extended and applied existence theorems for implicit functions and for solutions to differential equations. Bolza's most significant single contribution was the unification of the problems of Lagrange and Mayer into his more general Problem of Bolza. This problem was the fifth classical necessary condition for a minimum to appear. Leonhard Euler, Adrien-Marie Legendre, Karl Jacobi, and Karl Weierstrass had formulated the previous four. The problem of Bolza in parametric form is to find in a class of arcs $y_i(x)$, where $(i = 1, \dots, n; x_0 < x < x_1)$ which satisfy equations of the form

$$\phi_\beta(y, y') = 0 \quad (\beta = 1, \dots, p)$$

$$\psi_\mu(y) = 0 \quad (\mu = 1, \dots, q)$$

and end conditions of the form

$$J_\gamma[y(x_0), y(x_1)] = 0 \quad (\gamma = 1, \dots, r),$$

one that minimizes a sum of the form

In this formulation the problem of Mayer with variable end points is the problem of Bolza with its integrand function f identically zero, while the problem of Lagrange with variable end points is the case when G is absent from I .

The son of Emil Bolza and Luise König, Bolza displayed a variety of interests during his youth. At the Gymnasium in Freiburg, he eagerly studied languages and comparative philology, but when he entered the University of Berlin in 1875, he decided to study physics under Kirchhoff and Helmholtz. After tiring of experimental work, in 1878 Bolza switched to the study of pure mathematics. The chief mentor for his mathematical studies at Berlin was Weierstrass, who was particularly interested in the calculus of variations and strongly influenced the course of Bolza's research. From 1878 to 1880 Bolza's studies led him from Berlin to Strasbourg, back to Berlin, and then to Göttingen. After deciding that he wanted to teach, either in a Gymnasium or a university, he interrupted his mathematical studies from 1880 to 1883 in order to prepare for and pass the Staatsexamen, a prerequisite for Gymnasium teaching. From 1883 to 1885 Bolza returned

to his mathematical studies, working privately on his doctoral dissertation at the University of Freiburg. After [Felix Klein](#) accepted his dissertation on hyperelliptic integrals, he received his doctorate from Göttingen in June 1886. He followed this with a year's private seminar with Klein in Göttingen.

After completing his studies, two reasons prompted Bolza to abandon his teaching plans and go to the [United States](#). Friends complained of the lack of time allowed for research in German schools. Second, he was not robust and feared that Gymnasium teaching would be too strenuous for him. He had been rejected for military service in 1887. Bolza arrived in the [United States](#) in 1888, and in January 1889 he became reader in mathematics at [Johns Hopkins](#) University. In October of that same year he advanced to associate professor in mathematics at [Clark University](#). On 1 January 1893, Bolza became associate professor of mathematics at the newly founded University at Chicago. He advanced to full professor in the following year.

After 1898 Bolza felt a growing desire to return to Germany. In 1908 the death of Heinrich Maschke, an old college friend and a colleague at Chicago, severed perhaps the strongest bond that kept him in America. In addition, he felt that America had made great strides in the training of scholars and believed that he should step aside for the increasing number of young American-trained teachers. In 1910, when he left the [University of Chicago](#), he was given the title of nonresident professor of mathematics.

Upon his return to Germany, Bolza studied various subjects. He accepted the position of honorary professor of mathematics at the University of Freiburg, but in a few years [World War I](#) turned his prime interest from mathematics to religious psychology and languages, especially Sanskrit. He had grown up in a pre-World War I Europe in which people believed no major war could occur again: all problems would be resolved by reason. The trauma of [World War I](#) shook the foundations of thought for many, including Bolza; he turned to religious psychology and Sanskrit in search of answers on how to establish a better society. Bolza studied Sanskrit so that he could read firsthand the literature concerning the religious systems of India. His new interests prompted him to interrupt his mathematical research in 1922 and his class lectures in 1926. Bolza became more and more engrossed in psychological research, and he devoted full time to it from 1926 until 1929. The result of this work was *Glaubenlose Religion*, which he published in 1931 under the pseudonym F. H. Marneck.

In his final years Bolza remained an active academician. He returned to lecturing on mathematics at the University of Freiburg from 1929 to 1933, when he retired. After his retirement he continued to publish papers on mathematics and religious psychology. At the request of friends he wrote a brief autobiography, *Aus meinen Leben*. As late as 1939 Bolza wrote to friends of his interest in studying the foundations of geometry.

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