Anwendung der Differential- und Integralrechnung auf Geometrie. Von Georg Scheffers. Dritte, verbesserte Auflage. Volume 1: *Einführung in die Theorie der Kurven in der Ebene und im Raume.* Berlin and Leipzig, de Gruyter, 1923. x+482 pp. Volume 2: *Einführung in die Theorie der Flächen.* Berlin and Leipzig, de Gruyter, 1922. xi+582 pp.

The first edition of this book (1901, 1902) was discussed in this Bulletin vol. 7 (1900–01), p. 144 and vol. 8 (1901–02), p. 332. In the years 1910–1913 a second edition was published, in which the author had corrected his text in many points, especially under the influence of Study, whose papers of 1908 and 1909 (Jahresbericht and Transactions) had criticized Scheffers' book and the ordinary treatment of differential geometry in general. This third edition has not many points of departure from the second. Scheffers' book remains one of the best textbooks on the subject; it deals with the material in a very pedagogic way and illustrates it with many interesting examples. Complex values of the coordinates are treated carefully. The point of view of invariants is emphasized.

It belongs to the "older" type of book on differential geometry, so that the modern reader misses not only an application of vector methods, but also the more recent developments of absolute differential calculus, the parallelism of Levi-Civita, and, last but not least, the differential geometry "im Grossen," the "macroscopic" differential geometry. The only truly modern book on the subject is Blaschke, *Differentialgeometrie.*

Scheffers' book contains many historical footnotes. These are sometimes very interesting. They give, however, only a set of separated facts about the history of the theories. A history of the development of differential geometry is not given in Scheffers' book; in fact, it does not exist at all. This only would give the proper background to the historical notes.

D. J. Struik

Quellen und Studien zur Geschichte der Mathematik. Edited by O. Neugebauer, J. Stenzel, O. Toeplitz. Part B: *Studien.* Volume 1, Section 1. Berlin, Springer, 1929. 1–112 pp. RM 12.

This is the first number of the first volume of source material and studies in the history of mathematics, brought out under the editorship of O. Neugebauer of Göttingen, J. Stenzel of Kiel, and O. Toeplitz of Bonn. The first of six articles in this number is by Toeplitz and deals in a speculative way with mathematics in the writings of Plato. He opposes the thesis of A. E. Taylor (*Mind*, vol. 35, pp. 419–440; vol. 36, pp. 12–33) that Plato had evolved the concept of irrational number substantially as set forth in modern times by G. Cantor. Toeplitz sets up a thesis of his own, that Plato had an important ratio-concept playing a fundamental role in his general theory of ideas. Another article, by F. Solmsen, stresses the influence of Plato in the evolution of the mathematical method—the method which draws necessary conclusions. Stenzel discusses the logos of Aristotle.

Of great interest is Neugebauer's discussion of recently discovered Sumerian and Babylonian tablets which disclose not only a very early use of sexagesimal numbers and sexagesimal fractions, but also a knowledge of geometry not hitherto found in ancient Babylonian records. The area of a trapezoid is given.

There appear also somewhat complicated relations involving the sides of similar right triangles in problems requiring the solution of quadratic equations like $x^2-16x-80=0$ and $3x^2-44x-320=0$. The only pre-Grecian solution of quadratic equations known up to the present time had been the Egyptian, in problems leading to the pure quadratic form $x^2=c$. The geometric figures on the Babylonian tablets are defective, suggesting to Neugebauer the remark that the characterization of geometry as the science which draws correct conclusions from incorrect figures applies to its very beginning. Another article prepared jointly by Neugebauer and W. Struve, of Leningrad, reveals that the Babylonians measured the length of the circle by $C=d\pi$ (d = diameter), and the area of a circle by $A=C^2/12$, where $\pi=3$. The rule for the circular area in the Egyptian Rhind papyrus involves a more accurate value of π, namely, $\pi=3.16$. New also is the conclusion that the Babylonians were familiar with the *theorem of Thales*, that a triangle inscribed in a semi-circle is a right triangle; and with the *Pythagorean theorem*, at least for the sides 20, 16, and 12. These theorems are used in the computation of the length of a chord of a circle. Another new historical find is the Babylonian computation of the volume of the frustrum of a cone, by multiplying the arithmetic mean of the upper and lower basal areas by the altitude. In marked contrast to this mere approximation is the Egyptian accurate computation of the volume of the frustrum of a square pyramid (*Ancient Egypt*, 1917, p. 100). Historical investigations of the present century indicate that ancient Babylonian and Egyptian mathematics was much more highly developed than was formerly supposed.

FLORIAN CAJORI

Vektoranalysis mit Anwendungen auf Physik und Technik. By R. Gans. 6th edition. Leipzig and Berlin, B. G. Teubner, 1929. viii+112 pp.

This excellent little book is too well known and appreciated (six editions in 24 years!) to need a detailed review. Suffice to say that a mathematician as well as physicist will find there unexpectedly rich material, which is selected with great care. The book should be highly recommended as an introduction or as a "first help" to students interested in applied mathematics. The value of the book would still increase if it were supplied with exercises, which, unfortunately, are entirely absent. This is a point to be improved upon in the next edition, which undoubtedly will appear before long.

J. D. TAMARKIN

Operational Circuit Analysis. By Vannevar Bush, with an appendix by Norbert Wiener. New York, John Wiley and Sons, 1929. x+392 pp.

This is an elementary text on the Heaviside theory, for engineers. The method of exposition is largely that of Carson; a pleasing innovation is the inclusion, in Chapter 13, of some of the points of view of Wiener's paper in Mathematische Annalen, volume 95. There is a large collection of problems and the presentation appears in general to be satisfactory from the standpoint of the engineer, although one might occasionally wish for somewhat more precision in the statement of results. In the appendix, Wiener gives a quite pleasing description of some of the high points in Fourier analysis.

T. H. GRONWALL