extensive, yet follows the same line as in the Italian text. The traditional treatment of surfaces of revolution follows the derivation of the general equation and of a number of characteristic properties, including illustrative examples of the ring surface.

The volume closes with a discussion of helicoids, each problem being introduced by a detailed analytic treatment.

No applications to shades and shadows or to other technical uses are made, the authors pointing out that such things would only act as a digression from the purpose of the book, which is to provide a theoretical development, suitable for teachers rather than for practitioners. A generous number of foot-notes give the origin of the important theorems and considerable other interesting information. A third volume is in preparation, which will give a systematic history of the development of the subject, and is to contain a detailed index of all three volumes.

<div align="right">VIRGIL SNYDER.</div>

Vorlesungen über Differential- und Integral-Rechnung. Von EMANUEL CZUBER. Dritte, sorgfältig durchgesehene Auflage. I Band, xiv + 605 pp., II Band, x + 590 pp. 8vo. Leipzig, Teubner, 1912. 12 Mks. each.

IT is scarcely necessary to review these well known volumes at great length. Professor Czuber writes in a clear and convincing style and his treatment of the processes of the calculus and the applications is classic.

The second volume of the second edition was reviewed for the BULLETIN by the present writer, May, 1909 (volume 15, pages 392–395). No occasion has since arisen for changing the views there expressed.

The two volumes contain much more material than is ordinarily included in the elementary and advanced courses in the calculus as given in this country. The first volume contains an excellent basis for an elementary course in differential geometry and nearly one third of the second volume is devoted to differential equations and their applications.

The principal changes from the second edition may be briefly noticed. The first volume of the third edition contains a treatment of roulettes, focal lines, or caustic curves in the plane, and loxodromes on surfaces. These curves were not considered in the second edition. The first volume is also

increased in several other less important particulars; e. g., Delaunay's theorem concerning the meridians of surfaces of revolution of constant mean curvature has been added to the articles on the curvature of surfaces.

The second volume of the third edition has been increased and improved principally in the part devoted to differential equations. In particular, the section devoted to the calculus of variations has been entirely rewritten and brought into closer touch with recent work in this subject. Also a section (§ 7) has been added treating of curvilinear integrals and integrals of functions of a complex variable. The section adds but nineteen pages of new material and the treatment is limited to the outlines of the theory.

It is not too much to say, in conclusion, that the two volumes under review form an almost invaluable addition to the library of the teacher of the calculus whether from the point of view of clear and concise statement, or from that of content. It may not be out of place, in this connection, to call attention to the straightforward and rigorous treatment of the fundamental limit

$$\lim_{n \doteq \infty} \ (1 + 1/n)^n = e$$

in article 30 of the first volume, in comparison with the somewhat apologetic tendency exhibited in some of our modern texts on the calculus to avoid the use of this limit. One may doubt the expediency of presenting all the details of the proof employed by Professor Czuber in a first course in the calculus, but such a doubt scarcely necessitates the use of bizarre, or non-consistent methods.

L. WAYLAND DOWLING.

Lezioni di Geometria proiettiva ed analitica. Di EDGARDO CIANI, Professore nella R. Università e nella R. Scuola Navale Superiore di Genova. Pisa, Enrico Spoerri, 1912. v+525 pp.

THE plan of replacing the traditional introductory courses in cartesian geometry and in synthetic projective geometry by one set of lectures covering the elements of both subjects is not new to Italian universities. In 1888, through the initiative of Cremona, the faculty of mathematical and physical sciences of the University of Rome sanctioned such a