They are deduced in a very simple way from the preceding general theory. Finally, the third part of the chapter is given over to the study of infinite products and especially to a comparison of the increase of functions with that of their zeros.

The last chapter (51 pages) is devoted to arithmetical applications. Its object is to utilize the theory of increase in the classification of incommensurable numbers. An indication of the contents of the chapter is given in the following list of topics: Relations between incommensurable numbers and increasing functions; continued fractions; approximation by means of rational numbers to certain classes of numbers; numbers of the second order and periodic continued fractions; approximation by means of rational numbers to any numbers whatever; approximation by means of algebraic numbers; case of the number e.

In this little book M. Borel has rendered valuable service by emphasizing in an effective way the fact that the theory of increase has a place of growing importance in the development of the theory of functions.

R. D. CARMICHAEL.

Elemente der Mathematik. By JULES TANNERY. Autorisierte deutsche Ausgabe von P. KLAESS. Leipzig, Teubner, 1909. x + 339 pp. 8 marks.

Two objects dominate the teaching of freshman mathematics: the one, which may not too inaccurately be called the classical, endeavors to give the student a certain proficiency in algebraic analysis or in geometrical logic; the other, which may be called the psychological, endeavors to give him a wide view over the realm of mathematics. The classical has for its educative end skill; the psychological, vision. The classical endeavors to build the structure by finishing one room at a time. The psychological endeavors to build first the framework and then to fill in the details. Whether it is better for the great mass of freshmen, who will have little or no mathematics after that year, to learn well how to work Horner's process or to solve trigonometric equations, or whether there should be preferred a knowledge of "what is a function, its variation, and the representation of its values," or a knowledge of how we determine "tangents, areas, volumes, and the new functions, curves, or surfaces thus arising" — is a question now in process of solution. To further the new view of what is desirable as it has been planned for French schools, the book under review was written.

The introduction of over one hundred pages clears up the notions of the student acquired in his secondary school work. These are usually vague and half-forgotten, and in most cases in such state that the student "has no desire to continue nor does he see any use for what he has already learned." After this review of first principles, the real advance begins and proceeds in a delightfully graceful manner from the consideration of the important conclusions that may be drawn from elementary identities, into the rise and solution of the quadratic equation; thence into coordinates, functions, limits, derivatives, and integrals. The intuition is constantly appealed to and nowhere is there difficulty for any student to follow the easy grade the course pursues. The last chapter, on astronomy, leaves the student face to face with one of the boundless realms he may enter through the mathematical door.

One can but feel that a student who has had such a course as this will have more genuine love and enthusiasm for continuing his mathematical studies than one who has been drilled in the conventional way. The original (or this translation or, let us hope, an English translation) ought to be in the hands of at least every teacher of elementary mathematics.

JAMES BYRNIE SHAW.

Komplex-Symbolik. Eine Einführung in die analytische Geometrie mehrdimensionaler Raüme. Von ROLAND WEITZENBÖCK. Leipzig, Göschen (Sammlung Schubert, LVII), 1908. 191 pp.

THE real subject of this little volume is line geometry in three and higher dimensions. The treatment however is not according to the old familiar methods but by the use of symbolic notation. The symbolism is founded on that of Clebsch, with which the author states that the reader should be familiar in order to follow this book with ease. The reviewer also wishes to emphasize this need of reading something on symbolic notation before undertaking this book. The symbolism however is sufficiently developed so that one can readily understand it, but a previous knowledge makes the reading more enjoyable. The only other attempt known to the reviewer to treat the subject of line geometry symbolically is that of E. Waelsch ("Zur Invariant-