proof and illustration very clear and are very successful in avoiding positive inaccuracies. The only place where the discussion might have been made a little clearer is on page 126, where the number e is defined as the limiting value of $(1+z)^{1/z}$.

The typography and arrangement of matter on the page are excellent, and the book as a whole is very attractive.

JACOB WESTLUND.

Second Course in Algebra. By H. E. HAWKES, W. A. LUBY and F. C. TOUTON. Ginn and Company, 1911. vii + 264 pp.

IN arranging this Second Course to follow the first year's work in algebra the authors have made the student's return to the study of mathematics both interesting and easy. The review of the main features of their First Course in Algebra as given in the earlier pages of this book is of course quite essential. It is presented in a way that leads the reader to more mature and accurate habits of thought; he is frequently shown certain limitations on what he supposed were very easy and familiar operations. From the very beginning of the text there is evident a definite effort to induce him to discriminate accurately and logically. We regret to note later in the book a few unfortunate digressions from the rigorous method of presentation that is so admirable at the beginning. The treatment of linear equations is given a new interest for the reader by the introduction of second and third order determinants. With these of course no proofs are given and little use is made of even the more elementary theorems in determinants. Simply to teach the student the actual use of determinants in the solution of systems of linear equations is certainly the wisest procedure at this stage. Graphs are used quite extensively in the solution of both linear and quadratic equations. A number of very instructive illustrations are given in which the solution of two quadratic equations may be reduced to the solution of a system of linear equations. The straight lines are shown in the graph to pass through the intersections of the conics. This visualizing process ought to give the algebraic manipulation a much more tangible significance. The reviewer does not advocate any proofs with regard to the properties of these conics, with the possible exception of the circle, but he does feel that the straight line and linear equation should be

treated rigorously when the student knows a little plane geometry. Neither in the First Course nor in the present work do the authors offer more than an intuitional explanation of the fact that a first degree equation defines a straight line. This plan of making merely plausible what could easily be proved rigorously is followed in the treatment of maxima and minima. One might question seriously the desirability of trying to find the maximum and minimum values of functions of higher degree than the second by means of elementary algebra. While quadratic functions can be treated rigorously by completing the square (no mention of which is made in the text), the cubics and others will usually present difficulties. When the desired information cannot be obtained accurately by the methods available, we are inclined to doubt the advisability of encouraging the student to guess at results from a picture.

In example 23, page 165, the length of time required to reduce the velocity 2 feet per second should be mentioned. The word "therefore," line 4, page 172, is not justified by the statements which precede it; the theorem in question is not proved for the general case. The word "limit" can scarcely be used with propriety on page 173 when it is not defined until page 176. The expression "about to stop" in example 17, page 173, is too inexact to merit serious criticism. The authors are to be commended for the emphasis placed on the exponential nature of logarithms. The chapter is arranged so as to teach the student to handle logarithmic and exponential equations with equal readiness and to change from one to the other with ease and certainty. The treatment of complex numbers is careful and instructive. That quite erroneous results may be obtained by careless multiplication and division of imaginaries is emphasized and a number of excellent illustrations are given.

J. V. McKelvey.

Le Calcul mécanique. Par L. Jacob. Paris, Doin et Fils, 1911. xvi+412 pp. with 184 figures in the text. 5 fr.

This concise presentation of mechanical calculators is the more valuable and interesting to the reader because of the author's style and systematic treatment. The scientific classification follows that adopted in the conferences in 1893 at the Conservatoire des Arts et Métiers held by M. d'Ocagne