in the (X, Y)-plane is congruent with any other curve of the same system, and that the curves of the two systems are likewise congruent with one another. The relation between the curves makes it possible to construct all of the necessary graphs by the aid of a single regular curve. The construction of these graphs is furthermore simplified by showing that, to find the logarithm of any number to the base ten, it is sufficient to map on the W-plane only that portion of the z-plane which lies in the first quadrant and between the circles whose radii are 100 and 1000 respectively.

The rectangular form of the functional region makes it feasible to divide that region into nine subdivisions, thus giving a more convenient arrangement for evaluating a logarithm than by means of one large chart. From the ten charts which follow the general discussion both logarithms and anti-logarithms of complex numbers may be approximately determined. Upon the assumptions made as to the accuracy in locating points of intersections of two curves and in reading the charts, the maximum error in the absolute value of the logarithm will not exceed 0.0005. This accuracy corresponds therefore to a three place logarithmic table. Of course, as in ordinary logarithms, these errors may accumulate in the process of computation, so that the final error may be larger.

Aside from a theoretical interest in the work of Dr. Bennecke as an exercise in mapping, students of physics and others will find the charts of practical value wherever computations involving the logarithms of complex numbers are necessary.

<div style="text-align:right">E. J. TOWNSEND.</div>

Elementary Algebra. By J. W. A. YOUNG and LAMBERT L. JACKSON. New York, Appleton and Co., 1908. ix + 438 pp.

THE guiding principle of the authors in this book is "a minimum of mathematical theory and a fuller recognition of the utility of the subject." This does not mean that the logical value of algebra has been ignored, but rather that the proofs given are put in a form which will appeal to and satisfy the mind of an average high school pupil ; when in a few places this seemed impossible, the authors have fallen back upon simple assumptions rather than upon the introduction of subtle distinctions and arguments savoring of higher mathematical methods. For example, instead of explaining the process of

multiplying quadratic surds by means of the theory of exponents as is usually done, they introduce this topic by the statement, "In multiplying expressions containing square roots, make use of the relation $\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$", and no proof of this relation is given.

The book is by no means radical, as it covers the usual topics of elementary algebra in about the conventional order, and presents material more than sufficient to meet present college entrance requirements. The method is inductive throughout. It may be characterized as modern, since the terms function and variable are used, graphs are included, determinant solution of simultaneous linear equations and methods of detached coefficients are given.

An important feature is the number of oral exercises scattered throughout the book. The reviewer believes oral work has been too much neglected in the last decade; numerous simple oral exercises often fix a principle better than complicated written exercises and besides give excellent drill in thinking and oral expression. Unfortunately there is no index of terms defined, but summaries of definitions, notions, and processes at the end of each chapter partially meet this need and have the advantage of fixing operations in the minds of the pupils. Graphs are used in treating the topics variation, simultaneous equations, and the quadratic. Graphs are not presented as selected topics from analytical geometry, but are used only where they bring insight into algebraic processes. However, the terms graph of a function and graph of an equation are used interchangeably where it seems desirable to the reviewer to distinguish carefully between graph of a function and locus of an equation. Equivalent equations are defined but no statement of operations which lead to equivalent equations is given. "A proportion is an equation between two numbers" (page 173) is doubtless a misprint, for proportion is correctly defined in another place (page 162).

This is one of the good elementary algebras recently published and deserves careful examination by teachers considering a change in algebra texts.

ERNEST B. LYTLE.