

The work certainly marks the greatest advance in the pedagogy of elementary mathematics which has yet appeared, and is deserving of a wide adoption as a text.

S. E. SLOCUM.

Business Arithmetic. By C. W. SUTTON and N. J. LENNES. Allyn and Bacon, 1918.

THIS book begins in the most elementary manner with the most elementary operations of arithmetic and covers in great detail their applications to almost every kind of a business transaction which one could imagine which calls for such elementary operations. A printed list of topics which are considered would be far too long to give here. So much information of a business nature is given and given so carefully that the book should prove valuable to any one, particularly a business man, as a book of reference; it is veritably a compendium of business knowledge. However, as a textbook, it violates the well-developed belief that better results are obtained by presenting relatively few fundamental principles and facts and then devoting the rest of the time to stimulating independent thought, rather than by the statement and explanation of a multitude of fairly independent principles and facts. It may be that business arithmetic is an exception. Only those who are familiar with the great number of terms and expressions involved can appreciate the difficulties of attempting to treat the subject in accordance with the theory advanced above.

There is a multitude of problems—there are over one hundred problems on some pages—but the problems are so elementary and frequently so similar that it seems at times that sufficient drill could be obtained by a smaller number and valuable time thus gained.

It is the reviewer's belief that any textbook on elementary mathematics—and especially one on business arithmetic—should include at least a simple statement or discussion of some of the rules for numerical computation. It is with considerable misgivings that we note (in Art. 147) the instructions given the student in adding the numbers 12., 1.49, .978, 640.2, 4.904, .007, which will surely serve to authorize him to ignore the adopted convention followed in writing numbers to indicate the degree of the accuracy. Twelve problems follow on page 115 establishing firmly this dangerous fault which is already all too prevalent.

The book is carefully written and printed and is excellent for purposes of a thorough drill in business principles, but it is not conducive to rigorous and independent thinking. It would probably prove very useful as a textbook in a business school.

C. H. FORSYTH.

Empirical Formulas. By THEODORE R. RUNNING. No. 19 of Mathematical Monographs edited by Mansfield Merriman and Robert S. Woodward. New York, Wiley, 1917. 144 pp.

ONE of the problems of the engineer, chemist, physicist or statistician is the finding of a formula, simple as possible, by means of which an approximate value of one variable may be computed from a given value of another variable. The volume under review is concerned with this indeterminate problem, which is not necessarily the problem of determining the physical law connecting the variables in question. In the first five chapters, which make up the principal part of the book, twenty different forms of equations are taken up, tests are given to show when each type of equation may be suitable for given data, and methods for determining constants are discussed and in many cases illustrated by a concrete example worked out in detail.

For example, one form of equation discussed, No. XVI, is

$$(x + a)(y + b) = c.$$

To test a given set of data thought to follow this law, we plot

$$x - x_k, \quad \frac{x - x_k}{y - y_k},$$

where x_k, y_k are any two corresponding values from the data. If these points lie on a straight line, then it may be assumed that x and y are related as above and we may proceed to find the constants. To illustrate this case the results of a set of experiments giving the potential difference and the current in an electric arc are used and the problem worked out in detail.

Included in these twenty types of equations is the Fourier's series with a limited number of terms to which a whole chapter is devoted. Twenty figures in an appendix show some of the forms of curves belonging to each equation considered. The