Politische Arithmetik oder die Arithmetik des täglichen Lebens. By MORITZ CANTOR. Leipzig, B. G. Teubner, 1898. Pp. ix + 136.

OUR author was fortunate in the choice of the title of his work, for the object of the book is to render intelligible to the lay reader the transactions of the business world which are based upon mathematics. Calculus is used to some extent but the concrete instances which follow and interpret the formulæ in most cases render the meaning clear to the average reader. To the American the space devoted to interest and speculation in nearly superfluous, but he finds of interest the chapter devoted to the description of the various systems of lotteries that have played so large a rôle on the continent. I know of no work in which the theory of probabilities and the formation of life tables are more clearly and concisely developed. We look in vain for a demonstration of the economic loss arising from gambling which is so forcibly put in the writings of Daniel Bernoulli, but in a treatment from a purely mathematical standpoint, perhaps the author has done well to leave the ethical problems untouched, and not to attempt to walk on that slippery ground that separates legitimate from illegitimate speculation. With a clear knowledge of this book the reader will be better prepared to appreciate the work being done by such writers as Pareto and F. Y. Edgeworth. Within the limits set to himself Cantor has succeeded admirably, and the average reader will find the financial page of the daily paper more intelligible from a careful perusal of his little book.

WM. B. BAILEY

Introduzione alla Economia Matematica. Dei PROFESSORI F. VIRGILII e C. GARIBALDI. Milan, M. Hoepli, 1899. 18mo, pp. x + 210.

THE use of mathematical method is rapidly increasing among economists, so that a training in it is now essential in order to understand much of the best modern work. To supply such training in the use of symbolic argument in this and allied fields is the object of the present work. It is interesting to Americans to note that the first book in this line, slightly briefer than this, is by Professor I. Fisher, of Yale. When reviewed in Italy it received high commendation, and the volume in hand is an effort to do for the Italian scholar the same thing that was attempted for English readers by Professor Fisher.

The chief interest in the book lies in the historico-critical Introduction of 69 pages, in which the principal economists who have employed the mathematical method, and their leading works are noted—a growing list, in which English and American authors are rightfully preëminent. It closes with an analysis of the place of this method in economics as a quantitative science, and quotes many of the instances in which the errors of the older economists have been cleared away, and other cases in which truths undreamt of and unattainable under cruder conditions have been won by it. The authors long for some Laplace to unite into one system the rather scattered materials now at hand, and forecast a bright future for the science which is as yet the youngest of the mathematical family. A bibliography of a dozen pages (condensed from one by Professor I. Fisher in Cournot's Mathematical principles of the theory of wealth, Macmillan, '97) serves to indicate, forcibly though incompletely, the increased application of mathematical method in recent years.

The work proper is divided into three books: I, Elementary algebra; II, Elements of trigonometry and analytic geometry; III, Elements of theory of functions of real variables—occupying 40, 21 and 69 pages respectively. In book I are short summaries of elementary operations; of equations of the first degree and of the second degree with one unknown; of logarithms; of combinations; and of probabilities. Book II has two short chapters—on distance and angles, and on Cartesian coördinates. With book III come those portions which are most generally useful to economists. Part I—Differential calculus—gives preliminary ideas on functions and limits, derivatives, differentials, functions of many variables, maxima and minima. The last chapter, and the two on integrals which follow, are perhaps of the greatest service.

The book is a model of clearness and discretion. Each subject is treated simply and with a view to its application. Many of the fundamental problems of economics are taken up in connection with the development of mathematical theorems, and the whole forms a body of material which ought to be of the greatest service to economists. It should help to do away with the necessity hitherto felt by nearly every one of them who uses mathematics, of defending his practice, and of writing a text book of mathematics in his opening chapters. It might well serve as a text book in any case where only the elements of calculus are desired, and application is to be made at once to economics, psychology or the like.

J. M. GAINES.