BOOK REVIEWS

The Probability Integral. By W. F. Sheppard. Cambridge, University Press, 1939. 11+34 pp.

This book contains six tables of values of functions related to the function $(2\pi)^{-1/2} \int_x^\infty e^{-t^2/2}dt$, and was published for the British Association for the Advancement of Science. It is the seventh volume of the series of mathematical tables published by the British Association. The tables may be described as follows:

Table I. The ratio of the tail area of the normal curve to its bounding ordinate, with reduced derivatives, at intervals of one-hundredth of the standard deviation, to twelve decimal places.

Table II. The ratio of the tail area of the normal curve to its bounding ordinate, with reduced derivatives, at intervals of one-tenth of the standard deviation, to twenty-four decimal places.

Table III. The negative natural logarithm of the tail area of the normal curve, for integral multiples of the standard deviation, to twenty-four decimal places.

Table IV. The negative natural logarithm of the tail area of the normal curve, with reduced derivatives, at intervals of one-tenth of the standard deviation, to sixteen decimal places.

Table V. The common logarithm of the tail area of the normal curve, with reduced derivatives, at intervals of one-tenth of the standard deviation, to twelve decimal places.

Table VI. The common logarithm of the tail area of the normal curve, with second central differences, at intervals of one-hundredth of the standard deviation, to eight decimal places.

By the nth reduced derivative of a function $f(x)$ is meant the expression $h^n f^{(n)}(x)/n!$, and in the tabulations the value chosen for h is the argument interval. Thus accurate interpolation is made possible by the use of the Taylor expansion. The number of reduced derivatives given for each entry varies from 3 to 16.

There is an introduction, by J. O. Irwin, which explains the use of the tables clearly. The Introduction also states that the idea of preparing such a volume of tables was originally conceived by the late Dr. Sheppard, who had in mind a set of tables which would form the basis of the computation of the probability integral "to as many decimal places as would ever be required." The work was not completely finished by Sheppard; the reduced derivatives in Table II, and all of Table VI, were computed by individuals appointed by the Committee for the Calculation of Mathematical Tables of the British Association. All the tables have been checked.

The book is attractively and very legibly printed on paper of good quality.

J. H. CURTISS

Le Origini del Calcolo Infinitesimale nell' Era Moderna. By G. Castelnuovo. Bologna, Zanichelli, 1938. 164 pp.

This book is number 12 of the series Per la Storia e la Filosofia della Matematiche, a collection published under the auspices of the Italian Istituto Nazionale per la Storia delle Scienze and which was founded and directed by F. Enriques, whose name no longer appears. After an introductory chapter on Archimedes it reports on the growth of the infinitesimal calculus in the sixteenth and seventeenth centuries, beginning with Maurolycus and Commandinus and ending with Newton and Leibniz. An appendix contains Newton's "Tractatus de quadratura curvarum" (1704) and Leibniz' "Nova methodus pro maximis et minimis" (1684) in an Italian translation with notes by Professor E. Carruccio. Professor Vacca has given valuable advice in the composition of the book.

The distinguished geometer of the University of Rome has given an unusually clear picture of the different steps which the mathematics of the infinitesimal took in its formative years. "I have tried to show in the clearest possible way how the new science originated when the antique conceptions of Archimedes' genius were fertilized with the new doctrines of algebra and analytical geometry on one side, and of dynamics (or better cinematics) on the other," he writes in the preface. Though he gives a brief sketch of the lives of each of the great contributors, he intentionally avoids discussion of the many personal and priority squabbles which characterized some of their work. Concentrating on the major figures, he has been able to reconstruct before our eyes the important results which gradually completed the structure of the differential and integral calculus. He uses a number of more recent papers, especially some written by Italian historians, and adds some interesting information in the concise bibliographies which end each chapter.

The reader will be wise to compare this book with the recent book of C. B. Boyer, *The Concepts of the Calculus* (Columbia University Press, New York, 1939), which discusses a larger period and also penetrates deeper into the philosophical arguments which formed an important aspect of the study of the infinitesimals from the time of Zeno to the time of Cantor, but has not Castelnuovo's wealth of mathematical details. A sociological study of the development of the