

SHORTER NOTICES

Versicherungsmathematik. By Friedrich Böhm. 2d edition. Vol. 1. (Sammlung Götschen, no. 180.) Berlin and Leipzig, de Gruyter, 1937. 151 pp.

This small, almost vest-pocket edition contains a surprisingly large amount of very useful information in actuarial mathematics. In this Volume 1, no attempt is made to divide the year into fractional parts, and minor details are omitted. However, the reader gets an excellent survey of the subject, even up to annuities and insurances upon two lives, without, however, an introduction to Makehamization. Of special interest to American readers will be the treatment of reserves, this treatment being somewhat comparable with that in the Menge-Glover text. The gross premium is, however, analyzed into *four* constituents—a 2 per cent charge for collection of premiums, in addition to net premium, first cost amortization, and administration or renewal expense. The examples shown for entrance ages of 40, 50, and 60 put first cost amortization at about 5 to 7% of the gross premium, and administration cost at about 1 to 3%. The Zillmer restriction of initial cost of 3.5% of the insurance is mentioned as 35 per mille. Readers not familiar with the per mille symbol, with its double zero at the base may read this as 35%, and be startled in imagining a \$350 initial charge for writing a \$1000 policy. Gross reserves are discussed from equations of the form: gross reserve plus present value of gross premiums equals net reserve plus present values of administration and collection costs. A second restriction attributed to Dr. A. Zillmer maximizes the provision for initial cost as that provided by the " $x+1$ " method—full preliminary term. The book is well supplied with tables; it has an index at the end and excerpts from insurance laws, and on page 7 a short but well selected bibliography. Altogether, Dr. Böhm has given us a very interesting book.

E. L. DODD

Funzioni Analitiche. By Francesco Tricomi. Bologna, Società Tipografica già Compositori, 1936. 6+110 pp.

Funzioni Ellittiche. By Francesco Tricomi. Bologna, Società Tipografica già Compositori, 1937. 9+274 pp.

These two books are nos. 14 and 15 in a series of monographs on applied mathematics published under the auspices of the National Council of Research and edited by Nicola Zanichelli.

The first of these volumes has as one of its purposes the presentation of the fundamentals of the theory of functions of a complex variable in sufficient detail to serve for the study of the elliptic functions as treated in the second volume; and in both volumes the author has endeavored to develop the theory in such a way as to make the applications to particular concrete problems as easy and direct as possible. In this he has succeeded admirably. It is no mean task to select from the wealth of the literature on analytic and elliptic functions the material that would best suit the author's purpose. The selections have been made with discrimination and have been treated skilfully. It is particularly refreshing to read a book on elliptic functions free from the mire of countless formulas that so often clutter books on this subject.

For the technical student wishing to acquire a working knowledge of the fundamentals these books are to be recommended. Furthermore, the student of pure mathematics will find the author's point of view invigorating.

A brief outline of the contents of the two books follows.

Funzioni Analitiche. Chapter 1. Complex numbers, functions, Cauchy-Riemann equations, harmonic functions, conformal mapping, irrotational fluid motion. Chapter 2. Cauchy's integral theorem, residues, Cauchy's integral formula, Dirichlet's problem, mean value theorems. Chapter 3. Infinite series, the Taylor and Laurent expansions, poles and isolated essential singular points. Chapter 4. Analytic continuation, Riemann surfaces, the elementary transcendental functions, Mittag-Leffler's theorem, Weierstrass's theorem.

Funzioni Ellittiche. Chapter 1. Historical introduction, periodicity, the Weierstrass π , ζ , and σ functions. Chapter 2. Elliptic integrals. (This is a particularly good treatment of the subject.) Chapter 3. The sn , cn , and dn functions of Jacobi, Jacobi's theta functions. Chapter 4. The π functions related algebraically, transformations of elliptic functions, automorphic functions, Landen's transformation. Chapter 5. Applications: rectification of the ellipse and hyperbola, geodesics on an ellipsoid of revolution, loaded elastic columns, simple pendulum, a problem in conformal mapping arising in aerodynamics. Table of principal formulas.

G. E. RAYNOR

Random Variables and Probability Distributions. By Harald Cramer. (Cambridge Tracts in Mathematics and Mathematical Physics, no. 36.) London, Cambridge University Press; New York, Macmillan, 1937. 8+121 pp.

The two customary and time-honored approaches to the theory of probability start from the a priori definition of probability in terms of equally possible cases (Laplace) on the one hand, and from an empirical formulation of probability in terms of relative frequencies (von Mises) on the other. The former approach, while lending itself readily to a discussion of games of chance, fails inevitably to justify the application of the theory to physical science; the latter runs into analytical troubles in connection with the existence of certain limits essential to the theory. The present treatise, following chiefly the work of Kolmogoroff, avoids the difficulties of the two extreme attitudes by placing the meaning of probability on an axiomatic footing, regarding it merely as a given number, subject to certain limitations, associated with an event. The question as to the legitimacy of this association, which looms alarmingly in other treatments, is simply decided by a pragmatic appeal to its success. Thus the theory of probability becomes a branch of the theory of completely additive set functions.

The method of analysis used throughout the book is that of Fourier-Stieltjes transforms, which renders the work elegant and concise. The treatment is limited in so far as the author restricts himself to probability distributions in spaces of a finite number of dimensions, and foregoes practically all applications of interest to physical science. Clear and lucid in style and arrangement of material, Cramer's book is destined to prove of value not only for the mathematician who seeks a brief authoritative exposition of the fundamentals of probability theory, but also for the student of applied science who wishes to inform himself of the basic ideas of so useful a calculus.

HENRY MARGENAU

Structure of Atomic Nuclei and Nuclear Transformations. By G. Gamow. Oxford, Clarendon Press, 1937. 12+270 pp.

This book is a second edition of the book *Constitution of Atomic Nuclei and Radioactivity* which was reviewed in this Bulletin, vol. 39, p. 487 (1933). Unlike most second editions, the book is completely new, since the neutron was discovered after the writ-