BOOK REVIEWS

PITT, H. R., *Integration, Measure and Probability* (Oliver and Boyd Ltd., 1963), viii + 110 pp., 25s.

One of the main difficulties facing any writer on probability theory is that any rigorous account of the subject needs to draw on the theory of measures on abstract spaces. Many authors, in seeking to avoid this difficulty by judicious hand-waving, have succeeded in giving the unfortunate impression that the theory cannot be developed without sacrificing the standard of rigour which is expected of any branch of pure mathematics. It is refreshing, therefore, to find a book which adopts a different solution, and combines an introduction to probability theory with an account of abstract measure theory.

The remarkable feature of this book is that the author has managed to compress these two subjects into a mere 110 pages. He has done this by giving very little motivation and no exercises for the reader, and has thus produced a text which may be too concise for the students to whom it is addressed.

The account of measure theory is fairly straightforward. Measure is first defined on a ring of subsets, and used to define the integral, from which is deduced the extension of the measure to the generated σ-ring and its completion. After proving the usual convergence theorems, the Hahn-Jordan decomposition, and the theorems of Radon-Nikodym and Fubini, the author specialises to Lebesgue-Stieltjes measures in Euclidean space, and finishes with an account of convolutions and characteristic functions. This is all done in 44 pages.

The part of the book devoted to probability theory begins inauspiciously by rejecting the Kolmogorov definition of a random variable as a measurable function in favour of a less explicit one. Expectations are studied, and a severely classical account is given of the standard distributions in one or more dimensions. Conditional probabilities are defined, and a brief description of Bayesian inference given which is sure to cause confusion by using the term " likelihood " for what is usually called " posterior probability ". The book ends with a chapter on limit processes, which includes a long discussion of the general central limit problem (but nothing on the strong law of large numbers) and a section on stochastic processes with independent increments.

It will be seen that, within the small compass of this book, there will be found a wide (though arbitrary) selection of interesting material. The author is often careless about details, asserting for instance (on page 105) that a function continuous on the rationals has a continuous extension to the reals. For all its faults, however, this is a book which seems likely to exercise a considerable influence on the teaching both of measure theory and of probability theory in British universities.

J. F. C. KINGMAN

BRADIS, V. M., MINKOVSKII, V. L. AND KHARCHEVA, A. K., *Lapses in Mathematical Reasoning* (Pergamon Press, 1963), xiv + 201 pp., 15s.

This is a revision and amplification by the second of these authors of an earlier work by the other two, now translated from the Russian by J. J. Schorr-Kon.

After an introductory chapter containing a classification of mathematical sophisms by type, with exercises in their correction, the next one is devoted to arithmetical lapses; the level here is roughly junior secondary. Later in this section a full discussion is given of each illustration, a procedure which is followed all through the book.

Chapter III is algebraical and far more extensive in scope. It contains, in addition to many instances of blunders due to division by zero in varied disguises, or to faulty handling of inequalities, examples exhibiting the necessity for rigour in mathematics, a necessity which many students fail to appreciate. The chapter ends by elucidating common sources of confusion in elementary complex algebra, and the level extends from " O " minus to " A " plus.

Geometrical fallacies have a long history, and, although Chapter IV is on mainly traditional material to " O " level, it is stimulating and is probably the most complete such collection in English.

Trigonometrical howlers, at level " O " plus, are dealt with scantily in Chapter V, and approximate computation at the same level even more sketchily in Chapter VI.

It will be seen that the standard of matter treated is far from uniform, reaching a considerable maximum in Algebra, to which is devoted the longest and most interesting chapter in the book. In general the treatment, while less arresting than, say, that of Northrop, is very thorough everywhere, and is sufficiently detailed for the needs of those studying alone. The variation in level of topics selected is chiefly responsible for the book just missing completeness as an anthology at Grammar School standard, of mathematical error and its correction. Many teachers, as well as pupils, will benefit from its study: it should be in every school and training college library.

SELWYN READ

Studies in Mathematical Analysis and Related Topics: Essays in Honor of George Pólya, edited by G. Szegö and others (Stanford University Press; London: Oxford University Press, 1963), xxi + 447 pp., 80s.

This volume, published on the occasion of his 75th birthday, contains sixty original papers by leading mathematicians of the United States and Europe who have been inspired by the teaching or researches of Professor Pólya, together with a list of Pólya's publications and a preface by the editors on his distinguished career. Most of the papers are in fields to which Pólya himself has contributed, and many of the authors indicate Pólya's influence on the development of their subjects and give fuller historical backgrounds than are usual in research papers. Predictably one finds the names of Boas, Erdélyi, Hayman, Littlewood, Szegö, Titchmarsh, Zygmund and others in the list of authors, but the presence of such names as Brauer, Coxeter and Davenport is a striking reminder of the breadth of Pólya's interests and his contributions to pure and applied mathematics.

It was not to be expected that every one of the authors could produce a specimen of his most memorable work to order for the occasion, but this well-produced volume is a worthy tribute to one of the most outstanding mathematicians of our time.

P. HEYWOOD

RYSER, H. J., *Combinatorial Mathematics* (Carus Mathematical Monographs, No. 14; published by The Mathematical Association of America, distributed by John Wiley and Sons, 1963), xiv + 154 pp., 30s.

Beginning with sets, permutations and combinations, the very first principles of the subject, the author leads us to the forefront of modern combinatorial analysis. Inevitably in a compass of some 140 pages, the account is compact and has to be read with careful attention, but this is a small price to pay for the convenience of a self-contained monograph. The author leads us to such heights as an extremely elegant construction of pairs of orthogonal Latin squares of order $12k+10$, part of