Mathematical theory of probability and statistics, by Richard von Mises, edited and complemented by H. Geiringer. Academic Press, New York, 1964. vii + 694 pages. $22.00.

This book is based on the Harvard and Zurich lectures as well as the previously published work and notebooks of von Mises. The editor has done an excellent job of organizing the material into a unified whole, and has attempted to clarify arguments that were unclear in the earlier published work of von Mises.

The first two chapters are concerned with the von Mises frequency theory of objective probability which we now briefly describe. Consider a sequence of Bernoulli trials. Then the related "collective" of von Mises is the set of sequences which have the property that for all subsequences of a certain type the frequency ratios exist. Probabilities are then defined on the class of sets having content in the sense of Jordan assuming that probabilities are defined for finite sequences. Hence the class of sets for which probabilities are defined is smaller than in the usual Kolmogorov measure theoretic approach. According to the author the Kolmogorov class of sets contains sets with no conceivable relations to observations.

Chapters 3, 4, 5, and 6 deal with distribution theory, sums of random variables and asymptotic distributions.

Chapters 7 to 11 cover various questions in statistics; in particular the Bayesian approach to inference and an original discussion of the Neyman-Pearson theory. Finally the book ends with an introduction to the theory of statistical functions.

Although this book will be of primary interest to those concerned with the foundations and history of the subject, it is worthwhile reading for any student of probability or statistics.

D. A. Dawson, McGill University

A graduate course in probability, by Howard G. Tucker. Academic Press, New York and London, 1967. xiii + 273 pages. $14.00.

As the title suggests, this book is tailored for a basic course in probability theory and as such it is one of the best presently available. The eight chapters cover probability spaces, probability distributions, stochastic independence, basic limiting operations, strong limit theorems for independent random variables, the central limit theorem, conditional expectation and martingales, and an introduction to stochastic processes and especially Brownian motion. A good basic course in real variables and measure theory is an essential prerequisite for this book. With the possible exception of the last chapter all the material is so basic that every first course should contain it. The presentation of the proofs of the main theorems is given in great detail and with effective use of preparatory lemmas. The text material is supplemented with a modest number of straightforward but relevant problems. The one possible flaw as a text book is the complete lack of reference to applications. In spite of this the elegance and extreme lucidity of the presentation make this an outstanding contribution to the text book literature on probability theory.

D.A. Dawson, McGill University

Elementary partial differential equations, by Paul W. Berg and James L. McGregor. Holden-Day Inc., San Francisco, 1966. xv + 421 pages. $11.95.

Some knowledge of methods of solution of linear partial differential equations, particularly those based on separation of variables, is essential for the modern physical scientist or engineer. An understanding of the basic ideas involved, particularly of the question of what auxiliary conditions are appropriate to each class of equations, is necessary for a true grasp of these methods. In the past, there have been many books aimed at covering this material, usually together with a collection of other topics of importance to students in the physical sciences and engineering. The book by Berg and McGregor, like the one by H. Weinberger reviewed in the Bulletin recently (vol. 10, no. 1, p. 149), concentrates on partial differential equations. This does not mean that either of these books is devoted exclusively to partial differential equations; both include a good deal of material on ordinary differential equations and Fourier series which are needed. As most students have probably not seen such material previously, this is an excellent idea.

The book by Berg and McGregor is a careful treatment of partial differential equations, well-motivated by physical problems. After some introductory material, various problems for the heat equation are treated by separation of variables. This leads to an explanation of eigenfunction expansions and Fourier series, and a discussion of the existence problem with particular attention to the assumption of boundary values. The remainder of the book covers the wave equation, problems on infinite intervals (by Fourier transform methods), initial - boundary value problems, the Laplace equation, and problems which involve Bessel functions. The treatment throughout is careful, correct, and readable. Most important, it is presented from a modern point of view; nothing in this book will have to be unlearned by a student who goes on to more advanced work in partial differential equations.

It is natural to try to compare this book with the one by Weinberger. Both are mathematical treatments, motivated by physical problems, and presented by authors who are in touch with modern developments. Weinberger's treatment is a little more thorough, but is undoubtedly more difficult for students. In the reviewer's opinion, if a student is equipped to cope with Chapter 1 of Weinberger's book, he should. If not, and this may be the more common situation, the book by Berg and McGregor is a good choice.

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