The Theory of Games and Linear Programming

By S. Vajda. Pp. 106, with 14 diagrams. (New York: John Wiley and Sons, Inc.; London: Methuen and Co., Ltd., 1956.) 8s. 6d. net.

THIS book provides a useful introduction to linear programming and to the terminology and basic concepts of games theory for those who have a reasonable knowledge of matrix algebra and analytical linear geometry. Newcomers to these subjects should find the text and mathematics easy to follow despite a cumbersome use of subscripts intended to provide a generality that is not needed. Chapters 1 and 4 in particular give a sound outline of games theory and linear programming, respectively, with a minimum of mathematics.

Linear programming is treated in a straightforward and commendable manner. The common problems that occur (for example, degeneracy) are discussed in some detail and four methods of calculating the solution of a linear programming problem are given —the simplex and dual simplex methods, the method of leading variables proposed by E. M. L. Beale and an 'inverse matrix method', apparently Dr. Vajda's own invention.

The theory of games receives scant treatment by comparison. Only one type of game is discussed—the two-person zero-sum game—and that is employed mainly to provide examples of a use to which linear programming methods may be put. Little mention is made of other types of game. Two proofs of the minimax theorem are included; one being the proof given by von Neumann. Numerous simple numerical examples are given to illustrate the text. Discussion of the practical applications of linear programming is necessarily restricted by the size of the book. The references given at the back of the book provide a useful basis for further study.   P. R. FISK

Inorganic Qualitative Analysis

Semi-Micro Methods. By H. Holness. Second edition. Pp. vii+152. (London: Sir Isaac Pitman and Sons, Ltd., 1956.) 12s. 6d.

THE author of this little book is well known as an enthusiast on his subject, and this volume is based on long experience with students and their difficulties. It describes the equipment necessary for students working up to a pass degree standard and, as economy has been kept in view in the selection and design of the apparatus, it should have a wide appeal to school science teachers. In fact, I have reason to know that many schools already use the apparatus and methods herein described.

It is sometimes urged, usually by people who have not studied this type of approach, that semi-micro-methods tend to destroy the didactic value of a systematic course of analysis and to replace it by a series of more or less selective 'spot' tests. This book should dispel that idea, for the analytical scheme is essentially the time-hallowed Fresenius group scheme with certain distinct improvements, many of them due to the author. The methods of separation and the confirmatory tests are clearly described, and there is a wealth of helpful advice on many points which are apt to puzzle students. The technique is such as to instil the necessity for clean and careful working, and the author claims—and rightly—that large classes can carry out their work with a minimum of smell and personal movement. The book is well produced on good paper and appears to be free from misprints.

A. D. MITCHELL

Hydrodynamics

By Hugh L. Dryden, Francis D. Murnaghan and H. Bateman. Pp. iii+634. (New York: Dover Publications, Inc., 1956.) 2.50 dollars, paper bound.

THIS book was originally published by the United States National Research Council in 1934. It is in four parts. The first and shortest part, by all three authors, deals with the basic physics of fluids and classical hydrodynamics. The formulæ for divergence, etc., are derived, but the major part is an account of the types of flow to which classical perfect fluid and viscous fluid theories apply. The rest of the book is all by H. Bateman. The second part is on the motion of an incompressible viscous fluid, the third on turbulent flow and the last on compressible fluids. It is not a book for beginners in hydrodynamics but an excellent one for reference to many special types of flow. The emphasis is on application to hydraulics and aerodynamics. It is not geophysical; tidal waves are not mentioned. It contains the initial stages of the statistical theory of turbulence. The bibliographies are excellent and so are the subject- and author-indexes. The only illustrations are clear line drawings. The book is now, of course, out of date, but as a reference book in its field up to 1934 is a very useful addition to this excellent series of reprints which already includes the sixth (last) edition of Lamb's "Hydrodynamics". The only complaint is that the binding, which is stapled, is too tight so that the book must be forcibly held open.   G. A. BULL

Symposium on Monte Carlo Methods, held at the University of Florida, March 16 and 17, 1954

Edited by Herbert A. Meyer. (A Wiley Publication in Applied Statistics.) Pp. xvi+382. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1956.) 60s. net.

THE first symposia on Monte Carlo methods were held during 1949–50, when, in addition to the description of early successes, much time was spent on definitions. To-day, discussion of the definitional problem, as A. W. Marshall observes in his excellent introduction to the present volume, is largely beside the point. In the symposium under review we see the Monte Carlo method in its full vigour, accepted for a wide range of problems in statistics, physics, biology, game theory, engineering, and insurance. It is greatly significant of its extensive importance that in the last paper we read of first-year students at Darmstadt's Institut für Praktische Mathematik learning to estimate integrals by a Monte Carlo method immediately after having discovered what an integral is.

The remaining eighteen papers are a stimulating but heterogeneous collection. The expert will find much of interest and the novice (for whom no book has yet been written on the foundations of Monte Carlo) may approach without fear: the introduction and the paper by Curtiss (a detailed comparison of 'classical' and Monte Carlo approaches to the solution of linear equations) expose the fundamental attitude of Monte Carlo with great clarity. In addition to the applications already mentioned, there are papers on the generation of random numbers, techniques of variance reduction, and a conditional sampling technique by means of which 1,000 random numbers do the work usually designed for 5 million. The book ends with an extensive bibliography which includes many abstracts.   D. M. G. WISHART