

which it is shown how certain 'continuous' problems may be solved by regarding them as limiting cases of analogous 'discrete' problems. In this chapter geometrical methods are dismissed too briefly; though, as the author indicates, they are simply devices for evaluating the corresponding integrals, they are so frequently of service that more attention might well have been paid to them, both in drawing attention to their value and in warning of the dangers of their use in unsuitable cases. Another point that is insufficiently stressed is the need for extreme care in the choice of limits when the method of integration is employed; it will indeed be a red-letter day when the examiners find it unnecessary to comment on students' shortcomings in this matter.

Finally, some impression of the book as a whole should be given. This addition to the series of textbooks published under the authority of the Institute and Faculty has fully maintained, to say the least, the standard set by those already published, and that is a very high standard indeed. Two things in particular stand out. First, a probability textbook depends largely for its success on its worked examples; those given by Bizley are always appropriate to the context, instructive and fully and clearly worked out. Secondly, it is a real pleasure to read this book if only to appreciate the clarity, simplicity and elegance with which the author has expressed himself. Those who have heard Bizley's speeches at Institute meetings will expect something of unusual quality from him; they will not be disappointed.

L. V. M.

Introduction to Statistical Analysis. By WILFRID J. DIXON and FRANK J. MASSEY, Jr.

[2nd. Edn. Pp. xiii+488. New York, Toronto and London: McGraw-Hill Book Co. Inc., 1957. 45s.]

SUBJECT to certain qualifications which will appear below, this book should prove an excellent text for use by teachers of elementary (and immediately post-elementary) courses in statistical method, and also for those students whose circumstances force them to commence the study of statistics on their own. The main points of excellence of the book are the liberal supply of class exercises, problems and discussion questions, the detailed treatment of each statistical concept, so helpful to the beginner and so often ignored by the expert author, forgetful of his own period of training, and the unusually varied selection of tables provided. The book would have been of even greater value had outline solutions been given for at least some of the problems and exercises; perhaps this will be made good in a third edition.

The level of mathematics required from the reader is quite low, though a considerable facility in relatively simple algebraic manipulation would greatly reduce the time taken to master the contents. Indeed, the procedures of integration and differentiation appear nowhere in the book, though this necessitates giving a number of results without proof, e.g. in the estimation, by least squares, of the coefficients of regression equations.

The development of the subject matter follows well-established lines from descriptive statistics through definitions of universe (or population) to the Normal distribution, confidence intervals, tests of significance, analysis of variance and covariance and regression analysis. Unusual features of the book are the late introduction of discontinuous distributions (Poisson, binomial, etc.) and of the formal study of probability. The latter is not considered till the final

chapter, and the concept of 'expected value' is confined to the last section (about half a page) of this chapter. This is a rather unfortunate innovation, in view of the fact that the concept of probability (in the sense of proportion) and the simpler techniques of manipulating probabilities occur throughout the book. Indeed, there is a chapter headed 'Probability of accepting a false hypothesis'.

More acceptable features of the book are the two chapters on large ('macro-statistics') and small ('microstatistics') samples (in particular the too brief discussion of 'inefficient' statistics in the second of these), and a chapter on non-parametric statistics. There is also a chapter on 'sensitivity experiments', (better known, at any rate in England, as 'dosage-mortality problems') which is almost entirely devoted to the 'up-and-down' method of Mood and Dixon. This gives an unbalanced view of this subject in that the more widely used conventional methods of probit, rankit, logit, etc. analysis (or approximations thereto) are not mentioned.

The tables given at the end of the book are much more extensive than those usually found in elementary textbooks. They include the percentage points of the F -distribution for seventeen levels; of χ^2 for twenty-one levels; also a set of tables for use with 'inefficient' order statistics, and with various non-parametric tests. The book is well produced and not unreasonably priced for its size and quality.

N. L. J.

Numerical Methods. By R. A. BUCKINGHAM.

[Pp. xii+597. Sir Isaac Pitman and Sons, Ltd., 1957. 70s.]

THIS volume is a handbook designed for a person equipped with a hand computer—manual or electric. For this purpose it contains almost everything that the worker in numerical methods is likely to require. It is primarily a book of reference to be kept readily available for the research worker. Numerical work is of first importance to all practical scientists for whom it is essential to be able to handle numerical problems and to know the accuracy of any procedure. This aspect is given great emphasis in this volume and the reviewer, for one, welcomes such a bias.

The first six chapters are concerned with interpolation and allied subjects. The treatment is full and there are numbers of illustrative examples worked out in the text. An excellent examination is made, in Chapter 5, of the comparative merits of central difference and forward or backward difference interpolation formulae and also of the comparative accuracy of the central difference formulae. The next two chapters are concerned with the solution of ordinary differential equations and these are followed by chapters on polynomial equations, least squares and the solution of linear equations including the use of the relaxation method. The final chapters are concerned with further aspects of differential equations, including partial equations and various functions of two variables. The latter contains a painstaking account of the technique of cubature; it is useful to have the method set out so clearly. Four appendices at the end of the book give some details about moments, differences of zero, interpolation formulae and orthogonal polynomials. The latter go up to the fifth order and it is worth pointing out that polynomials up to the ninth order are given by D. Van Der Reyden in the *Ondestepoort Journal of Veterinary Science and Animal Husbandry* of 1943.