

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.

The advent of electronic computers has meant that some of the methods found the most suitable for hand machines are no longer the best for electronic use. Thus, the Runge-Kutta method is commonly used for numerical integration on electronic computers, but not very often on hand calculators. Perhaps there is scope now for a book that specializes in techniques suitable for electronic calculators. What is certain, however, is that there will still be a need for much computing to be done on standard hand-calculating machines and for that purpose this book fulfils a real need.

P. G. M.

Teach Yourself Statistics. By RICHARD GOODMAN.

[Pp. 239. London: English Universities Press Ltd., 1957. 7s. 6d.]

THIS very concise book covers a great deal of ground in just over 200 small size pages. A summary of its contents is necessary to give some idea of what is done. The book can conveniently be divided into sections. The first section deals with distribution theory, starting with the general properties of distributions and then illustrating these properties by particular consideration of the Binomial, Poisson and Normal distributions. The latter is derived as the limiting form of the Binomial. The next chapter—the longest in the book—deals with correlation including a consideration of the uses of rank correlation and the fitting of polynomial regressions. The chapter ends with a brief discussion of multiple and partial correlation. The next section deals with the fundamental distributions of sampling theory, namely, the t and F distributions, leading naturally to a section which is concerned with the analysis of variance and of regressions. Cross-classifications, but not hierarchical classifications, and Latin squares are used to illustrate the procedures. The analysis of regressions includes testing for linearity. The last chapter in the book gives the theory and the practical applications of the χ^2 distribution including its use in the analysis of 2×2 tables.

The level of mathematics assumed throughout the book is about the standard required by the Institute of its students, and it should therefore prove quite readable to such persons. In some directions it goes rather wider than the Institute's syllabus for IB and IIB, but this does not occur often enough to be a serious handicap. The style of writing used is extremely concise and rather mathematical so that, occasionally, the book almost degenerates into a set of rules and axioms. Small asides, however, that occur from time to time save it from this fate and the wide range of subjects for exercises, from dice throws to accidents occurring in blast furnaces, give the book a feeling of vitality that it might otherwise lack. There are numerous examples in the text and quite a few exercises, many based on examination papers of London University, the Institute of Actuaries, or the Royal Statistical Society. Anyone really learning the subject from scratch must work through the exercises himself or the full advantages of the book will not be reaped. The absence of an index, although there is a full list of contents, might prove a handicap.

A few places in the book struck the reviewer as misleading. For example, on page 160, F is defined as the ratio of the larger to the smaller of two estimates of variance. If this rule is followed when testing the equality of two estimates the given table of the F distribution will give the 10 and 2% points, not the 5 and 1%. This follows because the bottom half of the F distribution has been removed by the modified definition of F , and hence the upper areas doubled. Again, in discussing rank correlation coefficients no standard errors are given