The effect of the changes is that what was already a good book is now even better. The most difficult part of the book has been subjected to the greatest change: section 7, on projective and inductive limits, is much more readable than its corresponding part in the first edition, but it is still difficult. The exercises play as important a part in section 7 as they do in the rest of Bourbaki's work; that is, valuable results and counter-examples are given as exerises.

R. M. DICKER

Infinitistic Methods. Proceedings of the Symposium on Foundations of Mathematics, Warsaw, 2-9 September 1959 (Pergamon, 1961), 362 pp., £5.

This is a record of the proceedings of the Symposium on the foundations of mathematics which was held in Warsaw in 1959. Of the 27 papers presented at the Symposium, 22 are included in this book, and 12 of these are written in English. The subject of the Symposium was declared to be " infinitistic methods in the foundations of mathematics " and to a large extent that also describes the book. Most of the papers are on mathematical logic and are naturally classified in that way. However, there are four titles that suggest other connexions: " Some properties of inaccessible numbers "; " Locally small categories and the foundations of set theory "; " Les logiques à plusieurs valeurs et l'automatique "; and " A practical infinitistic computer ".

It is clear that this book will be important to logicians, but other mathematicians will probably find little of interest in it. An irritating feature is the occasional appearance of spelling mistakes: the book was edited and produced in Poland.

R. M. DICKER

KNEEBONE, G. T., *Mathematical Logic and the Foundations of Mathematics* (Van Nostrand, 1963), xiv+435 pp., 65s.

This book is intended as an introductory survey, or guide-book, on mathematical logic. It is very readable and can be recommended as a source of knowledge and instruction. It is not a textbook on the mathematical details of the subject; indeed, most of the mathematics is omitted and the reader is expected to refer to other books for complete proofs. This is certainly not a disadvantage. The author is able to write an account of the various topics which is suitable for a wide readership and which serves as an introduction to the existing textbooks on mathematical logic. Furthermore, by adding supplementary notes, the author is able to survey the literature and give references without disrupting his text. Thus this book is useful in several ways: it is sufficiently self-contained and simple to be read by students; it is an introduction to the more mathematical texts; and it surveys the field for those who need to dig deeper. It will be valuable to the beginner as well as to the advanced student; however, the latter should not expect too much of the book—it does not contain everything you need, but it does contain a lot that is worth having.

The book covers a wide range of knowledge; the size and depth of this coverage is indicated in what follows. Part I, on mathematical logic, consists of chapters on traditional logic, the propositional calculus, the calculus of predicates, and some further developments. Part II, on the foundations of mathematics, considers the history and development of formalised mathematics. the limitations of formal systems, and intuitionism. There are also chapters on recursive arithmetic, and the theory of sets. Part III is on the philosophy of mathematics; and there is an appendix on the recent developments in mathematical logic. Part I is a clear exposition of the fundamentals of the subject and the supplementary notes at the ends of the chapters indicate the extent of our knowledge. Part II is treated in much the same way as

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Part I. However, the subject-matter is less elementary and although Part II is suitable for postgraduate study it cannot be recommended for less sophisticated students. This is not meant to imply that others will get nothing out of Part II: there is a background of historical and other details for the reader to enjoy. (The author's comments on the foundations of geometry are especially interesting.) Part III is not mathematical, but mathematicians with an interest in philosophy will certainly find it stimulating. The Appendix and Bibliography are useful sources of information and references.

R. M. DICKER

MACON, NATHANIEL, *Numerical Analysis* (Wiley, New York and London, 1963), xiv+161 pp., £2.

This book opens with the definition: " Numerical analysis, by general definition, is the branch of mathematics concerned with developing and evaluating techniques of employing computers to solve problems." One cannot accept this definition without reservation. Many problems on computers do not involve numerical analysis, while sound numerical analysis brings many others within convenient range of desk calculation. Accordingly, though much must be left out of " a textbook for a one-semester first course in numerical analysis ", this reviewer cannot accept that an account which nowhere uses or refers to finite difference methods is a suitable introduction to the subject.

Within the terms of reference of the opening definition the coverage of the subject is reasonable for a first course, though very heavily coloured by this avoidance of finite difference methods. For example, quadrature methods are confined to trapezium and Simpson rules and Gaussian methods. The latter, though excellent for automatic computation, are hopelessly impracticable for hand work on those occasions when the former rules gives insufficient precision without an absurdly large number of ordinates. Similar remarks could be made in many other places. Curiously, the opposite failing is present in the chapter on characteristic values and vectors of a matrix, where the only method discussed, iteration by repeated multiplication of an arbitrary vector by the given matrix, is one which is satisfactory on matrices within range of desk calculation, but only when used with a degree of intelligence difficult to simulate on a machine.

In short, the author's attempt to pave a royal road to high-speed automatic computation is unsuccessful, leaving a large gap between what can be done by the untrained arithmetician and what should be done on an automatic computer, and this is inevitable for there is no such road.

JOHN LEECH

COCHRAN, W. G., *Sampling Techniques* (John Wiley & Sons, 2nd edition, 1963), ix+413 pp., 72s.

The second edition of this excellent book shows a number of changes from the first edition. A glance at the table of contents shows that not only has the book been brought up to date, but many sections have been added or rewritten. In the earlier chapters one notes the introduction of estimates and comparisons between means and proportions for sub-populations or domains of study. The chapter dealing with stratified sampling has been sub-divided. The first part consists of standard theory and the second part contains not only the more specialised sections of the first edition but also new major topics such as the construction and choice of the number of strata, optimum sample sizes in strata under given precision conditions and two-way stratification for small samples. In Chapter 10, which is concerned with

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