gone through the mill and emerged more or less afloat. Otherwise much of their intrinsic beauty may be lost.

Chapter 1 deals with numbers for counting; Chapter 2 with numbers for profit and loss, and numbers for sharing; Chapter 3 with numbers unending; Chapter 4 with classes and truth functions, and Chapter 5 with networks and maps. Evidently, as seen from these headings alone, we are about to grasp the nettle in a determination to embrace mathematics in its modern setting, and that means, in brief, a deep appreciation of pattern and rhythmic quality.

A few examples will show how the process works. Forming successive powers of $(1 + x)^n$ and expanding, yields the array known as Pascal's triangle, with the relation of the coefficients to their neighbours 'above' and 'to left' in any two successive rows. The demonstration for the general case is by induction. An alternative approach, made easy by the result just obtained, leads to the well-known formula for selecting r out of n things.

The attraction of these particular demonstrations lies largely in the emphasis which they place on structure.

Further on, the act of integration is brought forward graphically with the vertical parabola. This is a pleasant change from the rather drab way of accepting it as a (sometimes very difficult) inverse operation to differentiation. But it is a little hard to see why the revered $\int y dx$ should be abandoned in favour of $If(x)$. Also there seems to be a slip in the last expression on p. 171 where x should presumably be b on the right-hand side.

Coming to more modern mathematics, the treatment of truth-functions and sentential propositions is admirable, and careful readers may even be bold enough to catch a glimpse of the summit of Gödel's theorem in the formula $\neg$ (sub $a - Pm$). Finally, come some intriguing problems in the colouring of maps and the properties of networks.

Physicists will be pleased to see a few simple examples of the application of Boolean algebra to electrical switching circuits. In effect, this provides a species of Occam's razor in that some surprising reductions in the number of switches and branches can often by achieved by such a use of symbolic logic. Incidentally, George Boole was not of Irish extraction; his roots were in Lincolnshire.

We can but express delight with Prof. Goodstein's book, coupled with high hopes that its mission will be amply fulfilled. F. I. G. RAWLINS

TABLES OF PROBABILITY AND STATISTICS

Guide to Tables in Mathematical Statistics

By J. Arthur Greenwood and Prof. H. O. Hartley. Pp. lxii + 1014. (Princeton, N.J.: Princeton University Press; London: Oxford University Press, 1962.) 55s net.

IN 1940 the National Academy of Sciences—National Research Council in the United States sponsored "a sub-committee on statistical tables to prepare an index and guide to existing tables in the field of probability and statistics". This very valuable book is the long-awaited result. It is easy to use, covers an enormous field and is moderately priced.

It will clarify things if I begin by saying what is not contained in the *Guide*. No references are given to tables of data, tables relating to quantum theory unless they are also tables of use to statisticians, and actuarial tables. Queueing theory tables are also not listed, nor are "tables of the *results* of random sampling experiments". Finite differences are dealt with very briefly. Otherwise its scope is virtually the whole of mathematical statistics up to about the end of 1960.

The *Guide* is divided into sixteen major sections, with a large number of subsections, and three appendixes. The section headings are: the normal distribution; the chi-squared and Poisson distributions; the beta and binomial distributions; the t-, F- and z-distributions; various discrete distributions; likelihood-test statistics; correlation; rank correlation; non-parametric tests; frequency curves, symmetric functions; regression and other curves; variate transformations; random numbers; quality control; design of experiments; sundry mathematical tables. Appendix 1 is a supplement to the main body of the *Guide*, bringing it more up to date, and is indexed accordingly. Appendix 2 is a list of contents of the more readily available books of tables, and Appendix 3 relates this *Guide* to Fletcher, Miller and Rosenhead's standard reference on tables. Finally, an author index and a very extensive subject index are given.

An example is possibly the best way of showing the detail of the *Guide*. Under the heading "2 × 2 table", which we find in the subject index under "test . . . in 2 × 2 tables", "2 × 2 tables", "2 × 2 tables . . . test of independence in", "Yates, F. . . . continuity correction", "Yates, F. . . . distribution of χ^2 in 2 × 2 tables", "four-fold contingency tables", etc., and under "Finney", "Yates", etc., in the author index, a concise description is given of the exact test for independence (with margins fixed). A list is given of all the tables available for computing exact significant levels. Reference is made to Fisher and Yates's paper with a table showing the effect of Yates's correction for χ^2 analysis, and a list of tables of the power function under different hypotheses is given.

This book is much more than just an index of statistical tables. The authors have fulfilled the call to provide a real guide to the tables cited. For example: when discussing some work of Cornish and Fisher, they refer the reader to Kendall and Stuart for "the most readable account" of the work. For cases in which it is now known that tables were computed from incorrect formula(e), the error(s) in the derivation of the formula(e) is given, and any logical inconsistencies in any of the quoted work are pointed out. When more than one type of table is available as an aid to computing, then a full discussion is given of the circumstances in which the different methods are 'best'. The reliability of quoted tables is also considered, and known printing (and other) errors in the original tables are given in full.

Every practising statistician will find it most useful to have this book within easy reach. M. C. PIKE

PROBABILITY AND MATHEMATICAL STATISTICS

Introduction to Probability and Mathematical Statistics

By Prof. Z. W. Birnbaum. Pp. viii + 325. (New York: Harper and Brothers; London: Hamish Hamilton, Ltd., 1962.) 46s.

An Introduction to Probability and Mathematical Statistics

By Howard G. Tucker. (Academic Press Textbooks in Mathematics.) Pp. xii + 228. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1962.) 46s.

THE Americans seem to be far in advance of the British in recognizing the importance of a training in statistics for the contemporary scientist or mathematician. This is the inevitable conclusion from the number of American statisticians who find it worth while to augment lecture courses into books on probability and mathematical statistics. With this flood of text-books, any one must be of particular merit or present a very personal approach to the subject to stand out from the throng. Prof. Birnbaum's book certainly achieves this. Within the limitations of its subject-matter it is lucid, logical and instructive.

Prof. Tucker's book appears at first glance to be above the general level on account of its unusual approach to certain points. But to me these personal touches fail