It aims at presenting the mathematics underlying elementary statistical methods. The general methods of estimation discussed are least-squares, maximum-likelihood (including large sample properties) and minimum-chi-squared. Emphasis on test construction is laid on the chi-squared test and the generalised likelihood ratio test is not mentioned. Particular tests considered in some detail are, in their order of occurrence, Kolmogorov's test; t; F; the sign test; Wilcoxon's and the Fisher-Yates' tests. Estimators for which the relevant distribution calculus is given are, again in order of occurrence, sample quantiles; for normal samples, the mean and variance, the correlation coefficient and partial correlation coefficients; and Spearman's rank correlation coefficient. The theory of optimality considered is limited to the Gauss-Markov, Cramér-Rao and Rao-Blackwell theorems, and the Neyman-Pearson theory of hypothesis-testing. A somewhat austere account of probability and random variables is given in the first chapter. There is another chapter on mathematical tools, and a good one on the methods of bio-assay.

The book has a curious inconsistent quality. In some places, there is a complete lack of motivation; elsewhere motivation and illustrative examples are good. Proofs are sometimes complete, sometimes given for particular cases only, and sometimes the reader is referred elsewhere for the proofs of results which are stated. And this seems to occur in a very haphazard fashion. Topics of current interest are discussed alongside others which might now be generally regarded as part of the dead wood of the subject. The organisation of the material is unusual.

These and other inconsistencies make the book unsuitable as a modern textbook. However, it has one extremely good feature. The reader is kept constantly aware that statistics is an applied subject by illustrative examples containing real data and by valuable comments on the practical strengths and weaknesses of different methods. It is a good book for background reading.

S. D. SILVEY

OGG, A., *Modular Forms and Dirichlet Series* (W. A. Benjamin, Inc., New York, 1969), xviii + 173 pp., cloth $15, paper $6.95.

This book evolved from lecture notes given to graduate students at the University of California at Berkeley. It covers in six chapters all the basic results in Hecke's theory of modular forms and associated Dirichlet series and this in itself makes the book worth while, since reading the original papers in German is not an easy task.

Chapter I is a fairly long account of Hecke's work in Dirichlet series while Chapter II is short and contains an easily read discussion of the theory of Hecke Operators for the full modular group by defining them as correspondences on the set of lattices, as well as by the usual method. In the following chapter the author introduces the Petersson inner product on the space of cusp forms and uses it to prove that the (finite dimensional Hilbert) space of cusp forms has an orthogonal basis consisting of eigenfunctions for the ring of Hecke Operators. This is then extended in the next chapter when the subgroups of the modular group considered are congruence subgroups. A recent result due to A. Weil (1967) on the characterisation of modular forms of level N constitutes Chapter V, and finally, in Chapter VI the author touches upon the construction of modular forms of higher level by forming the theta series of positive definite integral quadratic forms.

In the interests of rapid publication this book was produced directly from typescript prepared by the author, who, in the words of the publisher, " takes full responsibility for its content and appearance ". While it must be universally agreed that the author is the person to decide which material should be included in his book, it is regrettable that the publisher himself has seen fit to abdicate his responsibilities concerning the appearance of the finished article and to leave it entirely in the hands of the author.

The use of smaller typescript would have helped to make this book more readable, as would the underlining of those statements meant to stand out, e.g. the enunciation of a proposition, etc. This of course will not be a serious drawback to those for whom the book was primilarly intended—those doing a graduate course in modular forms. However, the book would have had more universal appeal had it been published in the more conventional manner, although, admittedly there would have been a delay of a few months in the publishing date, a delay which would not have affected the sale of the book in the slightest.

E. SPENCE

EISEN, MARTIN, *Elementary Combinatorial Analysis* (Gordon and Breach, 1969), x+233 pp., 145s.

The author gives a very leisurely account of the basic techniques available in combinatorial problems, covering generating functions, recursion and the inclusion-exclusion principle. Progress is very much via examples, and most of the " classical " problems such as the " problème des ménages " are covered. In the more advanced final chapter, the Möbius function on a partially ordered set is introduced, and used in one of two proofs of Burnside's result on orbits. This leads into Polya's theory of counting, and the book ends with a readable account of Polya's theorem.

Prerequisites for the book are nil; even the summation sign is explained at length. Comparison with Riordan's standard "*Introduction to Combinatorial Analysis*" is inevitable. Eisen covers much less but is more readable and, despite occasional pedantry, gives a straightforward introduction to combinatorial ideas which would be useful background reading for any mathematician who realises that he ought to be able to think combinatorially. Perhaps the fatal combination, however, is that of combining an assumption of mathematical ignorance on the part of the reader at the start with a specialised finale, at an excessive price. But if the book succeeds in making Polya's theory less of a specialist's topic, then it will have done a useful job.

I. ANDERSON

MILNOR, JOHN, *Singular Points of Complex Hypersurfaces* (Annals of Mathematics Studies, no. 61, Princeton University Press. London: Oxford University Press, 1969) 30s.

Let f: $\mathbf{C}^{n+1}\to\mathbf{C}$ be a non-constant polynomial and let $V=f^{-1}(0)$. Let $Z_0\in V$, let S_ε be a small sphere of centre z_0 and radius ε and let $K = V\cap S_\varepsilon$. In this beautiful monograph Milnor studies the topology of S_ε/K and K in the case where z_0 is an isolated singularity of V. The principal theorems are

I. The map

$$S_\varepsilon \smallsetminus K\to S^1;\ z\mapsto f(z)/|f(z)|$$

is the projection map of a smooth fibre bundle, the closure of each fibre being a smooth manifold of real dimension $2n$, with the homotopy type of a finite *CW*-complex of dimension n, and with boundary K.

II. The space K is a smooth $(n-2)$-connected $(2n-1)$-manifold.

Criteria are given for determining when K is homeomorphic to a sphere and for determining its differentiable structure in such a case. There is much interplay here with related work on exotic spheres by Brieskorn, Hirzebruch and Pham.

The first chapter provides an admirable introduction to the work of Whitney on algebraic sets. The proofs of theorems I and II depend on the " curve selection lemma " proved in Chapter 2 and on standard Morse Theory.

IAN R. PORTEOUS