the need for a "graph by graph" analysis of the formal perturbation series which arise. This is the main theme of the present text.

The book is divided into three parts. The first part deals with the relevant combinatorial tools such as Clifford's algebra, Grassmann's algebra, their interrelationships and various expansion theorems. Here the mathematical treatment is not sophisticated — most results being presented as formal manipulations of algebraic symbols. The first part also includes a chapter on miscellaneous applications of combinatorial theory (excluding quantum field theory and the Ising model). This may be of more general interest to classical applied mathematicians. The main content of Part I, however, is the intimate connection between combinatorics and Wick products — determinants and pfaffians being applied to fermion fields and permanents and hafnians to boson fields.

In Part II the formal theory of the particle propagators (Green's functions) is dealt with in x space, the methods of Part I being used to study unitarity, gauge invariance and the infrared divergences. It is here that one sees the economy of the combinatoric methods. For instance, with combinatoric methods, the linked cluster expansion of many body theory is derived for fermions in just a few lines. The fundamental problem of the existence of solutions is, however, only mentioned. The solution to this problem in general still seems a long way ahead, although the present methods clearly yield answers for specific models.

In the third and final part of the text two x-space regularisations are given and the analytic problems arising when these regularisations are removed are handled. Combinatorial tools are again used to great advantage in shortening many of the standard arguments. The last chapter deals with the Hartree Fock self-consistent field approximation and various models. Principally the Hartree Fock approximation is applied to the "Thirring" model and non-polynomial "Lagrangians". The exactly solvable Lee model is also discussed. In each case the prescriptions of the present text are applied and the relevant computations are carried out. The physical mass appears as the (non–unique) solution of a mass equation. The non-uniqueness of the physical mass is associated with the existence of inequivalent representations, interpreted in terms of spontaneous breakdown of symmetries. In the case of the Lee model the mass equation leads to "ghost particles" coinciding with the standard ones. The ease with which the calculations are done is again impressive.

The main results of the present text could be regarded as only advances in book-keeping. However, there may be analogies here with the situation regarding Feynman path integrals, say, some eleven years ago. If one reads Feynman's acceptance speech for the Nobel prize in 1965, one is left with the impression that he then regarded the path integrals as merely a useful book-keeping device. One wonders if, at that time, he foresaw the fundamental role which they would play in the hard analysis of constructive quantum field theory. The present text will, without doubt, prove a valuable addition to any mathematical physics library.

AUBREY TRUMAN

COLLINGS, S., *Theoretical Statistics — Basic Ideas Volume II* (*Transworld Student Library*), 148 pp., £0·85 (paperback).

Volume I of this series introduced the ideas of probability, random variables and discrete distributions. This volume on continuous distributions is essentially self-contained. The approach is summarised in the preface: "so much of the content of the subject resides in the mathematics, without which it is difficult to obtain a proper understanding".

The subject matter is distribution theory, the pre-requisite mathematical knowledge rather higher than A-level mathematics, the principal aim to derive the standard distributions which arise in sampling from a Normal distribution. The approach is unusual and intriguing, giving emphasis to the family of Pearson curves (categorised in a new way) and the identification of members of this family by their moment generating functions. The author's claim that this "helps to give a unified setting to all the common distributions" is largely true, especially in respect of limit theorems, although the reader may feel disappointed by the change of approach which the non-existence of certain M.G.F.s entails.

The author uses the phrase, obviously with dislike — "those dreadful overhangs from the days of Victorian statistics": I am unconvinced that he is not following the same path, being fascinated by the discovery and description of relationships between distributions, albeit in mathematical rather than numerical terms. The independent learner, whose modern educational needs are to be met by this series, will find a well-written book full of interesting mathematical manipulations. In itself, however, it is not a book about statistics.

R. M. CORMACK

SINCLAIR, ALLAN M., *Automatic Continuity of Linear Operators* (Cambridge University Press, 1976), 92 pp., £2·90.

Theorems on the automatic continuity of functions preserving certain algebraic structures have a natural appeal to mathematicians. Allan Sinclair, who has made notable contributions to this field, is to be commended for putting in permanent form his postgraduate lecture course on automatic continuity given at the University of Edinburgh. Most of the results involve Lebesgue rolling hump arguments; a preliminary chapter attempts to provide some universal technical lemmas and this streamlines the subsequent proofs of a rich variety of theorems, even though the synthesis is not as complete as the author would wish. A brief second chapter treats the problem of intertwining linear operators, i.e. operators S such that $ST = RS$ for some continuous linear operators T, R on Banach spaces, including complete answers when T, R are normal operators on Hilbert spaces. The main chapter deals with homomorphisms of Banach algebras and begins with Johnson's theorem on the uniqueness of complete algebra-norm topology on semi-simple Banach algebras. It also includes two methods of constructing discontinuous derivations, with an example for the disc algebra. The Bade-Curtis results are developed for homomorphisms of $C(\Omega)$ and the chapter culminates in homomorphisms and derivations of C^*-algebras. The final result reduces the existence of a discontinuous homomorphism of a C^*-algebra to a Banach algebra to the case when the C^*-algebra is $C[0, 1]$. Just after publication of these notes Dales and Esterle independently have shown that the continuum hypothesis implies the existence of a discontinuous homomorphism of $C[0, 1]$. The final chapter expounds the delightful results on the automatic continuity of positive linear functionals on Banach star algebras. There are full references to the literature and research problems are scattered through the notes. Functional analysts will find a lot of good reading in this slim volume, postgraduates will find it a boon.

J. DUNCAN

THOM, RENÉ, *Structural Stability and Morphogenesis: An Outline of a General Theory of Models* (Addison-Wesley, 1975), xxv+348 pp., $22.50 (cloth), $13.50 (paper).

Catastrophe theory lends itself to applications of a novel type, and a keen interest in these is spread far beyond the circle of experts in this field. Thus the appearance of a book such as the one under review, by so eminent an author, is an event of considerable