The author of this book shows that the appropriate mathematical theories to be used in this context are J. Leray's theory of residues, Thom's Isotopy Theorem and the Picard-Lefschetz formulae. This means a lot of algebraic topology, differentiable manifold theory, differential topology, homology of algebraic varieties, and of course, analysis. It is the author's intention to introduce even a "non-mathematical" reader to these theories and to show him their use. By "non-mathematical" reader, he obviously means a theoretical physicist. It is clear to anybody only slightly familiar with the mentioned theories, the author's aims cannot be achieved in a booklet of 140 pages. But the reviewer admits with admiration, that the author has nevertheless done an excellent job. After reading through this book, one certainly has got the "feeling" for the subject. The bibliography at the end makes possible a detailed study. The reviewer believes, therefore, that the book is a guide to exciting parts of modern mathematics useful for physicists and mathematicians at the same time.

Table of contents: I. Differentiable Manifolds. II. Homology and Cohomology on Manifolds. III. Leray's Theory of Residues. IV. Thom's Isotopy Theorem. V. Ramification along Landau Varieties. VI. Analyticity of Integrals depending on Parameters. VII. Ramification of an Integral with a Ramified Integrand. Notes. Sources. Bibliography.

E. Stamm, University of Toronto

Formalisme Lagrangien et Lois de Symétrie, par M. Gourdin. Gordon and Breach, Paris, 150 Fifth Avenue, New York, 1968. vii + 99 pages. Cloth: U.S. $10 (prepaid U.S. $8); paper: U.S. $6 (prepaid U.S. $4.80).

This is one of the monographs in the useful new series Cours et Documents de Mathématiques et de Physique, published simultaneously in French and English. It would be more correct to say that this is a series of lecture notes; hence the rather concise and collection-of-formulae aspect of the present book. But, as mentioned in the preface, the series is not meant to replace textbooks; rather its aim is to provide graduate students with scientific information in a rapid and fairly inexpensive way. In this spirit, the author has assembled here the relevant facts about Lagrangian formalism, canonical commutation laws Poincaré group, continuous transformations, parity, charge conjugation, time reflection and strong reflection. The appendix consists of relevant formulae on quantisation of free fields.

D.K. Sen, University of Toronto

Élasticité Linéaire, par L. Solomon, Masson et Cie., Paris, 1968. xix + 742 pages, 122 fig. 150 F.

In the history of Mathematics and Mechanics, certain books stand out from time to time as monuments of erudition and scholarship, compiling and presenting in a stylish and balanced manner existing knowledge on a certain topic and bringing the reader to the very frontier of learning. The great Cambridge treatises of the late 19th and early 20th Centuries, by Lamb, Love, Jeans, Whittaker and Watson, spring readily to mind. It is now 76 years since the first edition of Love's Mathematical Theory of Elasticity was published, and over 40 years since the fourth and last. It is no exaggeration to say that Élasticité Linéaire, by Monsieur L. Solomon, Maître de Conférences in the University of Bucharest, ranks with such illustrious predecessors and satisfies an urgent need of the present day.

M. Solomon has limited himself, almost exclusively, to the elastostatics of homogeneous isotropic solids. The book falls naturally into three principal parts - introduction and general theory; anti-plane and plane problems, and three-dimensional problems - with an appendix on the theory of functions of a complex variable.

The introduction begins with a description of the behaviour of a solid subject to simple tension, the stress-strain curve, definitions and hypotheses. Then follow chapters on the analysis of strain, principal axes and invariants, and the analysis of stress and the equations of equilibrium. These lead naturally to the relations between stress and strain, the generalised Hooke's Law, anisotropy and isotropy and the elastic constants. The thermodynamics of deformation, elastic potential energy and hyperelastic solids are also considered. Lastly, the complete system of equations of linear elasticity (often called after Navier, but more correctly, as M. Solomon points out, after Lamé) is discussed, together with a uniqueness theorem, the semi-inverse method, and the general properties of the solutions. Small motions of elastic solids are considered and the two types of plane waves obtained.

Thus far, in about 140 pages, M. Solomon has given a concise and clear introduction to the theory of linear elasticity, such as might prove suitable, with the addition of some examples, for an introductory half-year course to senior honours undergraduates in Applied Mathematics or Theoretical Mechanics. Only Cartesian tensors have been used.

He then embarks on the second part of the book; a comprehensive presentation of solutions of plane and anti-plane problems. Complex variable is introduced and applied to the bending and torsion of slender cylinders whose sides are free from stress, using the functions of Capildeo and Milne-Thomson, Prandtl and Timoshenko and Saint-Venant. Various solutions for both simply and doubly connected cross-sections are given, including the circle, ellipse, rectangle, circular crescent, circular and elliptic annuli and the lemniscate. Mechanical analogies of torsion are given.

In the chapter on plane elasticity, the methods of Airy, and of Kolossov and Muskhelishvili, are presented. Solutions of Neumann's problem for a circle, a circular annulus and the plane with a circular hole are given, together with the reduction of Dirichlet and Neumann problems to Muskhelishvili's integro-differential equation.

The last part of the book covers three-dimensional problems. Kelvin's and Clebsch's solutions of Lamé's equations are given, and the method of Grodski (perhaps more commonly called after Neuber and Papkovich) considered in detail, with the proof of the theorem of Eubanks and Sternberg on the number of independent functions in Grodski's representation. Kelvin's fundamental solution is given. Chapters on the elastic sphere, the elastic half-space, and problems of elastic contact, particularly punch problems, conclude this part.

The book has developed from a course in elasticity given by M. Solomon since 1953 in the Faculty of Mathematics and Mechanics in Bucharest. The bibliography is comprehensive, to say the least, extending from 1638 to 1966 and containing over 700 entries. There are, however, fewer than ten entries for 1966, most of them from one volume.

The book will be extremely useful for three particular groups of people; first, research workers in the field, which should go without saying; second, those planning a graduate course in elasticity, especially one conducted as a seminar; and, last, but not least, graduate students in quest of a research problem.

A. C. Smith, University of Windsor

Quantum statistical mechanics, edited by P. H. E. Meijer. Gordon and Breach, 150 Fifth Avenue, New York 10011, 1967. ix + 172 pages. Hardbound: U.S. $9.75 (prepaid U.S. $8.40); Paperbound: U.S. $4.95 (prepaid U.S. $3.96).

This book contains the lecture notes of a summer school on quantum statistical mechanics at the Catholic University of America. Unfortunately there has been a considerable delay in the appearance of this book (the date of the lecture is not given, but seems to be 1964). The course consisted of four parts.

P. H. E. Meijer gives an introduction to the density matrix, the Wigner distribution function, second quantization and the diagrammatic method (40 pages). (In the reviewer's opinion the treatment of the density matrix is inferior to that given in the textbooks of Messiah and Dirac, for example.) T. Tanaka reviews the Green's function method and the perturbation theory approach to the electron gas (64 pages). T. Morita gives a detailed discussion of the diagrammatic method (31 pages). The most interesting material is contained in the lectures by R. W. Zwanzig which are concerned with a careful discussion of master equations. A new derivation (now published, see Physica 30 (1964) 1109-1123) of a generalized master equation is given (33 pages).

E. J. Woods, Queen's University

Theoretical elasticity, by A. E. Green and W. Zerna (Second edition). Clarendon Press, Oxford, 1968. xv + 457 pages.

Since its first publication in 1954, Green and Zerna's treatise has become firmly established as an authoritative treatment of certain areas of the theory of elasticity, a subject which as a whole is now too vast to be adequately treated at the research level in a single volume. The authors have concentrated their development on three main branches of elasticity theory which are of current interest: finite displacements, complex variable techniques for plane problems, and shell theory.

The general arrangement of the second edition remains unaltered. Chapter 1 contains material on tensor analysis and a very brief discussion of Cauchy singular integrals. Chapter 2 develops the general equations of elasticity theory and Chapter 3 derives the solution of certain finite strain problems concerning circular cylinders and tubes. Chapter 4 discusses small displacements superimposed on finite deformations.

Infinitesimal strain is considered in Chapter 5 and the next four chapters are concerned with essentially two dimensional problems for both isotropic and anisotropic materials. Included is an account of Reissner's theory of transverse flexure, a most welcome inclusion. Extensive use is made of the representation of solutions in terms of pairs of complex potentials. This process enables biharmonic type boundary problems to be reformulated as Hilbert problems, the solution of which can be tackled by means of Cauchy singular integrals, a technique which is of wider application and which, in this reviewer's opinion,