Vector analysis and Cartesian tensors, by K. Karamcheti. Holden-Day, Inc., San Francisco, 1967. Burns and MacEachern Ltd., 52 Railside Road, Don Mills, Ontario. xii + 255 pages. Can. $10.75.

In the author's words: "The aim of the book is twofold

(1) to clearly and systematically explain the basic contents of vector analysis, Cartesian tensor notation and Cartesian tensor analysis and

(2) to illustrate by selected applications in different fields of engineering and mathematical physics, their use in the formulation of physical problems and in the derivation of some general results relating to those problems".

The second of these aims is, I think, achieved, the applications chosen being informative and of physical interest. The book however falls short of the first objective.

The definitions of both vector and Cartesian tensor are somewhat circular, on page four we find: "Thus we say that vectors are added according to the parallelogram law of addition" and on page five: "We now define a vector as a quantity that possesses both a magnitude and a direction and obeys the parallelogram law of addition".

The development of vector and tensor analysis is not good. Among the lapses I would mention the following: Some of the laws of vector algebra, for example the distributive laws, are not mentioned. There is no treatment of the ideas of linear independence. No proof is given that the operations of multiplication of two tensors and of contraction lead to a tensor. The integral theorems of Green, Gauss and Stokes receive formal treatment and no restrictions are stated on either the functions or domains involved. The invariance of vector and tensor equations is not demonstrated or in fact even mentioned.

It may be that the intended audience for the book, the student of engineering of the physical sciences, might find it satisfactory, but for a student of applied mathematics, it leaves much to be desired.

The book has a reasonable number of exercises which include some quite important results. These are collected at the end of the book rather than at the end of each chapter.

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Vector and tensor analysis with applications, by A.I. Borisenko and I.E. Tarapov. Translated by R.A. Silverman. Prentice-Hall, Inc., Englewood Cliffs, 1968. x + 257 pages. U.S. $10.50.

Although this book is not likely to become a classic in the field, it is a readable and fairly careful presentation of the main ideas of vector and tensor analysis.

The first chapter deals with the ideas of vector algebra and includes the basic laws, a treatment of linear dependence, bases and reciprocal bases, and the contraviant and covariant components of a vector.

The second chapter introduces the tensor concept beginning with Cartesian tensors and later general tensors. The invariance of tensor equations and its relevance to the formulation of physical laws are noted. There is also a section on the use of complex variable for transformations which are rotations about an axis, which to me seemed a little out of place.

Chapter Three examines the algebra of tensors, the reduction of Cartesian tensors to principal axes and introduces "pseudo tensors".

Chapter Four is on vector and tensor analysis and includes the integral theorems of Green, Gauss, and Stokes.

The final chapter considers the Christoffel symbols and the covariant derivative with applications to Fluid mechanics and Electromagnetic theory.

Each chapter contains an ample supply of problems both solved and unsolved.

My main criticism of the book is the way in which the authors change from Cartesian tensors to general tensors and vice versa, often without warning. There also seem to be a few errors, possibly misprints, involving the Jacobian of general transformations.

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Integration, by A.C. Zaanen. John Wiley and Sons, Inc., New York, 1967. xiii + 604 pages. U.S. $16.75.

The chapter titles for this book are: 1) Point Sets, Zorn's Lemma, and Metric Spaces; 2) Measure; 3) Daniell Integral; 4) Stieltjes-Lebesgue Integral; 5) Fubini's Theorem; 6) Banach Space and Hilbert Space; L_p Spaces; 7) The Radon-Nikodym Theorem; 8) Differentiation; 9) New Variables in a Lebesgue Integral; 10) Measures and Functions of the Real Line; 11) Signed Measures and Complex Measures; 12) Conjugate Spaces and Weak Sequential Convergence; 13) Fourier Transformation; 14) Ergodic Theory; 15) Normed Kothe Spaces.

This book is a substantially enlarged version of the author's previous An Introduction to the Theory of Integration (1958). Those familiar with the earlier work will recall that it presented both the measure theoretic and linear functional point of view and showed the natural intimate connections between them. The development in the early chapters of Measure and the Integral is largely unchanged and one may consult Mathematical Reviews 20 (1959) pages 657-8, for comment on it. (The introduction of measurable sets via Carathéodory's condition has been improved.) Suffice it to say that the author succeeds in his "attempt to produce an advanced textbook on integration theory, which makes the student familiar not only with the measure theoretic approach and the linear functional approach to the theory, but also with the fact that the integral of a non-negative function has something to do with the measure... of the ordinate set of the function" and "to make clear... that in the linear functional approach ... measure theory in disguise is used from the very beginning." (Preface.) Throughout the new edition, examples, discussions, and exercises have been liberally added. There are now 448 problems, with hints and solutions to many of them occupying over 100 pages at the end of the book. It is pleasing that although this edition is more than twice the length of the first, one can still cover the core of integration theory (through the σ-finite Radon-Nikodym theorem) in under 250 pages.