prerequisites, though a knowledge of calculus and linear differential equations is required for understanding and solving some of the examples and exercises.

There are however a few inadequacies. The reviewer would have preferred an early introduction of matrices. The book deals with them formally in Chapter 5, though they are used a number of times in the preceding chapters. Besides there is a large number of misprints and a few minor errors. In spite of this, I think the book will prove very satisfactory as a textbook at an advanced undergraduate level.

The chapters are: 1. Vector Spaces; 2. Further Properties of Vector Spaces; 3. Inner-Product Spaces; 4. Linear Transformations; 5. Matrices; 6. Algebraic Properties of Linear Transformations; 7. Bilinear Forms and Quadratic Forms; 8. Decomposition Theorems for Normal Transformations; 9. Several Applications of Linear Algebra.

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Theory of Matrices. BY PETER LANCASTER. Academic Press, New York and London (1969). 316 pp. U.S. $11.

This book is first of all a textbook for students of applied mathematics, engineering or science, but not only that. It presents also the most important, as well as some most recent results, in matrix theory, especially in the author's field of interest, i.e. perturbation theory and the theory of small vibrations.

Let us sketch the contents. The book has nine chapters and three appendices. Chapter 1 is the introductory one and contains the basic material about linear spaces, matrices and determinants. In Chapter 2, eigenvalues and eigenvectors of matrices are studied and properties of symmetric, hermitian, unitary and normal matrices are derived. Quadratic forms and definite matrices are discussed and used to the theory of small vibrations. Chapter 3 has the title Variational Methods and deals with the Rayleigh quotient and Courant-Fischer principle. In Chapter 4, the theory of lambda matrices is developed and used to the problem of normal forms of matrices under similarity transformations.

Chapter 5 contains the theory of functions of matrices. The author also use some notions of analysis to show the connections and adds some applications to the solution of differential equations. In Chapter 6, the theory of vector and matrix norms is developed. Chapter 7 is an introduction to the perturbation theory and contains also the most simple theorems on bounds of eigenvalues. Chapter 8 deals with three topics: direct products, solution of matrix equations and stability problems. In the last Chapter, the theory of nonnegative matrices and stochastic matrices is discussed and used to Markov chains. In the appendices, some theorems from analysis are recalled, the notion of the generalized inverse mentioned and literature for further reading suggested.

The book contains a great number of exercises as well as examples. It can be recommended not only to the students but to mathematicians with related field of interest as well.

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PRAGUE

Rings and Modules. BY PAULO RIBENBOIM. Wiley Interscience, New York (1969). vii+162 pp. U.S. $12.95.

This book was written for a first graduate course or possibly a fourth year honors undergraduate course in rings and modules. The book is well written and certainly deserves consideration by anyone interested in conducting an introductory course in rings and modules.

The organization is as follows: Chapter I consists almost entirely of definitions, which some students might find a bit bewildering. It seems worth mentioning that some definitions are never used in the sequel, and that tensor products are not defined but indeed are used, briefly and without referring to them by name, later in the book.

Chapter II consists of the basic results in ring theory, namely: the fundamental isomorphism theorems, Jordon-Holder theorem, Remak-Krull-Schmidt theorem, Fittings lemma, Jacobson radical, prime radical, Wedderburn-Artin theorem on semi-simple rings, etc. One could, with little effort, start with Chapter II, referring to Chapter I when necessary. The last part of Chapter II deals with the classical results on the centralizer and double centralizer of a module.

The last chapter deals with three separate topics: modules over principal ideal domains, rings of linear transformations of a vector space, and Von Neumann regular rings. Each section goes deep enough into its topic to give the student the feeling that he has been shown more than just the surface of the subject but has indeed begun to scratch the surface. This I feel is the real virtue of the book.

As the author points out, if you want an encyclopedic book on ring theory this is not for you, if you are looking for a beginner's book with a certain amount of depth in what it does cover this may fill the bill.

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