

BOOK REVIEWS

CHEVALLEY, CLAUDE, *Fundamental Concepts of Algebra* (Academic Books Ltd., London, 1956), 241 pp., 54s. 6d.

In this book some of the fundamental concepts of algebra are treated with great generality from an abstract point of view. Adopting the rigorously deductive mode of presentation of the modern French school, the author begins with monoids (associative systems with a neutral element). From there he proceeds to a brief discussion of groups, including free groups. This is followed by a substantial chapter on rings and modules, in which the idea of a tensor product plays a prominent part. A short chapter on general algebras is the prelude to a detailed study of some aspects of associative algebras. Here the reader will find applications of most of the concepts previously introduced, and he will meet some familiar concepts in a new guise; for example, determinants, which are not mentioned until p. 174 is reached, are defined within the framework of Grassmann algebras. The same ideas lead to results about derivations and to a definition of the Pfaffian. There are few illustrative examples in the text, but each chapter is followed by a large number of exercises, some of a fairly theoretical nature.

Although based on a first-year graduate course the book will be found difficult by most students. Inexorably theorem follows upon theorem (there are 73 on rings and modules in a space of 80 pages), and the inexperienced reader will need further guidance if he wants to understand the motivation for some of the abstract concepts, as distinct from the routine development of each concept once it has been introduced.

Nevertheless, Professor Chevalley's penetrating power and striking originality as a mathematician makes itself felt throughout the book. He has given us an authoritative account of some of the most vital and viable algebraical ideas.

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ZARISKI, O., AND SAMUEL, P., with the cooperation of I. S. COHEN, *Commutative Algebra*, vol. i (D. van Nostrand Co., London, 1958), 320 pp., 32s. 6d.

According to the Preface, Professor Zariski, having contemplated writing a volume on Algebraic-Geometry, felt constrained first to write a two-volume work on the underlying algebraic theory. Volume 1, written with the collaboration of Professor Samuel, is the book under consideration. Volume 2 is in preparation. Instead of writing an encyclopædic account of the subject the authors "have preferred to write a self-contained book which could be used in a basic graduate course of modern algebra." British readers should be careful to translate "graduate" as "post-graduate" for this is not a book for the novice. Bearing this in mind the volume is an excellent exposition of commutative rings, fields and ideals. The Chapter headings are I Introductory Concepts, II Elements of Field Theory, III Ideals and Modules, IV Noetherian rings, V Dedekind Domains, Classical Ideal Theory. There are valuable indexes of definitions and notations but the lack of a more comprehensive index impairs considerably the usefulness of the book as a reference work. The authors state that they are unaware of any systematic account of the subject since Krull's *Idealtheorie* published in 1935, but surely they have overlooked Gröbner's *Moderne Algebraische Geometrie die idealtheoretischen Grundlagen* (1949) and McCoy's *Rings and Ideals* (1948). The present volume does, however, contain some important material not to be found in either of these works and it should form a valuable addition to the library of an Algebraic Geometer or Algebraist.

The mathematical exposition in this work is usually admirable although the

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