

BOOK REVIEWS

BOURBAKI, N., *Éléments de Mathématique XXIII, Les Structures Fondamentales de L'Analyse Livre II, Algèbre, Chapitre 8, Modules et Anneaux Semi-Simples* (Hermann, Paris, 1958), 189 pp., 38s. 3d.

This chapter of Book II of the above series is divided into thirteen sections, and it is assumed throughout these that the rings have identity elements and that the modules are unitary.

The first section is concerned with commutative properties of rings and modules—centralisers, etc. The chain conditions of Artin and Noether are introduced in § 2, and in the following four sections the notions of “simplicity”, “semi-simplicity” and “radical” are considered. The radical and semi-simplicity of tensor products are discussed in § 7. §§ 8, 9 deal with applications of the preceding theory to composite extensions of fields and endomorphisms of vector spaces. § 10 is concerned with simple subrings of a given ring and with isomorphisms of simple rings, while these results are applied in § 11 to establish Wedderburn's theorem on division rings and to characterise the quaternions. The last two sections deal with norms and traces and with representation theory.

There is an Appendix containing a discussion of algebras which may not have an identity element, and this is followed by an interesting Historical Note in which the development of the subject through its main stages is traced.

The various concepts introduced in the text are well illustrated by means of examples, and there is an impressive collection of exercises at the end of each section. Nevertheless, the beginner will find this book difficult because of the practice of proceeding from the very general to the particular. On account of its unifying effect, however, this treatment should appeal to the reader with some experience.

A. GEDDES

LEVI, H., *Elements of Algebra* (Chelsea Publishing Co., New York, 3rd ed. 1960), 160 pp., \$3.25.

The aim, which Professor Levi had in mind when writing this book, was to provide a serious text on the foundations of algebra for university students whose course was not primarily mathematical in character, but from which the normal mathematical student could learn a great deal.

Using the theory of sets, the author develops the cardinal numbers, defines number systems in general, and leads to the construction of the integers, rational numbers and finally the real number system. At the same time algebraic expressions, polynomials and equations are clearly defined, whilst the book closes with a chapter on the Peano Axioms and the definitions of groups, rings and fields.

This is a book which should be available to the university student and the mathematical specialist at the training colleges. The printing and binding is up to the usual high standard of American publications.

G. ALLMAN

NATANSON, I. P., *Theory of Functions of a Real Variable* (Frederick Ungar Publishing Co., New York, 1955), 277 pp., \$6.50.

This is a translation by Leo F. Boron of the first nine chapters of a longer book by the author, published in Russian in 1941. It consists mainly of an account of the classical theory of the Lebesgue integral for functions of a real variable. The author assumes only a knowledge of elementary undergraduate analysis and begins with a chapter on infinite sets and cardinal numbers and another on open and closed sets of real numbers. Then the theory of Lebesgue measure for bounded sets is developed (by means of outer and inner measures). The Lebesgue integral of a bounded