Algèbre. Vol. 1. *Équivalences, opérations, groupes, anneaux, corps*. By Paul Dubreil. (Cahiers scientifiques, no. 20.) Paris, Gauthiers-Villars, 1946. 7+305 pp. 585 fr.

This book is the first volume of a series which is to cover the material necessary to a thorough introduction to modern algebra. The author presents a rather complete discussion of the basic facts of algebra such as the theory of groups, rings and fields. The material is elementary, that is, fundamental definitions and their consequences are discussed in a self-contained fashion. Thus, complications of proofs which usually arise when a mathematical system is specialized do not occur. No appeal to previous knowledge is made; at no place are facts stated without proof. The following list of contents illustrates the aim of the author to emphasize basic principles, constructions and techniques: Chapter I, sets and correspondences; chapter II, operations; chapter III, groups; chapter IV, regular equivalences; chapter V, fields; chapter VI, rings; chapter VII, algebraic equations.

Starting with elementary facts of set theory and emphasis on a single operation (defined by the use of abstract relations or equivalently by subsets of a cartesian product) additional postulates for the underlying mathematical system are gradually introduced. This method of presentation helps clarify the significance and implications of a given set of hypotheses, and the student becomes aware, at an early stage, of the interplay of ideas in a proof. An illustration of this approach may be found in the careful exposition of the general principles for the existence proof of complete fields; all details here are prepared carefully. In this connection it is to be pointed out that the "abstract" work of the initial chapters is by no means dry. The illustrations and exercises are chosen with thought; they are not constructions ad hoc. Rather, the reinterpretation of familiar results are used to enliven the general theory.

It is good to find in this book (p. 209) a clear statement of the distinction which should be made between the concepts of polynomial prevalent in algebra and analysis. The main body of the text is supplemented by four notes which are particularly useful since they emphasize the characterization of the system of natural numbers and the principles of induction.

O. F. G. SCHILLING

Funzioni analitiche. By Francesco Tricomi. 2d ed., Bologna, Zanichelli, 1946. 7+134 pp. 300 lire.

This is a brief sketch of the elementary theory of analytic functions of one complex variable. The author succeeds admirably in presenting a very readable account which makes plain the importance of the concepts, the power of the methods, and the broad outlines of the proofs.

More space than is usual in such a brief account is given to the connections of this theory with the theory of harmonic functions and of contour integration in vector analysis. Nine pages are devoted to simple applications to the theory of hydrodynamics. About six pages are devoted to well-illustrated discussions of the graphical representation of analytic functions by means of level lines of the real and imaginary parts. There are twenty-nine very good diagrams.

Little attention is given to questions of foundations. The reader is apparently assumed to have a working knowledge of real analysis from the point of view of a moderately rigorous upper-college course in the calculus, and the proofs are handled in the spirit of such a course.

The first chapter treats the definitions of continuity and analyticity, with some emphasis on the connection of the latter with the problem of conformal mapping. The second chapter discusses the Cauchy integral formula, with special attention to the relation of the Cauchy integral theorem to Green's theorem; the principle of the maximum is here derived for harmonic functions, and for the modulus of an analytic function. The third chapter considers Taylor's series and Laurent series, and the classification of singularities. The fourth chapter treats the general problem of analytic continuation, the Weierstrass concept of the complete analytic function, and Riemann surfaces; the special topics of Schwarzian reflection, exponential and trigonometric functions, Mittag-Leffler's theorem for meromorphic functions, and the Weierstrass product-theorem for entire functions are considered.

WALTER STRODT