has naturally led to attempts at extending the theory to the non-commutative case. The situation becomes naturally much more complicated: left ideals and right ideals have to be considered in addition to two-sided ideals; there are different possible generalizations of the radical, and of prime ideals and primary ideals; and there are, in particular, the secondary and tertiary ideals introduced in 1956 by the authors in order to elucidate the lattice structure of the set of (left or right or two-sided) ideals in a non-commutative noetherian or artinian ring. The tract under review contains a clear exposition of the theory, with particular emphasis on the lattices involved; proofs are frequently sketched or even given in full. The theory is developed simultaneously for rings, algebras over a field, and semigroups. There is a useful bibliography, listing 69 items up to 1961, and an index of terminology.

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<u>Principles of Abstract Algebra</u>, by Richard W. Ball. Holt, Rinehart and Winston Publishers, 1963. ix + 290 pages. $6.00.

The author's avowed aim is to present to college students an introduction to algebra in the spirit of the "new wave" high school texts. To achieve this object, he approaches the subject from a semi-axiomatic point of view and uses a style which is always explicit rather than concise. There are ample illustrative examples and exercises.

In the first part of the book, the domain of integers is introduced as a familiar set, which is then described through some of the axioms it satisfies. Well-ordering is postulated and used to derive the usual divisibility properties. Elementary group theory is developed to the point where it can be applied to prove the Fermat-Euler theorem in residue class rings.

The second half of the book considers the algebraic and (briefly) the analytic properties of the field of complex numbers and its subfields. Divisibility properties of polynomials over an arbitrary field are derived. Rolle's theorem and Descartes' rule of signs are stated (the fundamental theorem of algebra is "postulated") and their application to isolating the roots of real polynomials is discussed. The book concludes with a brief discussion of matrices (without determinants) and the solution of linear equations.

The book is clearly written and, within its own limitations, it might be considered for a course requiring a more gentle introduction to algebra than that of Birkhoff and MacLane.

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