METADATA

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Abstract

The book is intended to be an introduction to the concepts, results, and methods of Basic Algebra and is addressed to those who are taking an introductory Algebra course, as taught in two or more semester courses, usually in the second and/or third year of undergraduate studies, in Departments of Mathematics in Greek Universities, as well as to readers who are interested in being introduced to the basic elements of modern Algebra. The book focuses on the introduction and study of two of the most fundamental structures on which modern Algebra is based: the group structure and the ring structure. The book is divided into two thematic parts and 11 Chapters, apart from the Introduction, Chapter 0, which is dedicated to reminders of elementary theory of set and functions, the Principle of Mathematical Induction, the basic elements of divisibility of the integers, and the elementary structure of the complex numbers. The first thematic part is dedicated to elementary Group Theory and consists of Chapters 1-6. The first part analyzes the main concepts, primary examples, fundamental constructions, as well as the basic results of Group Theory. For example, the structure of cyclic and permutation groups is analyzed in an accessible depth. The second thematic part is dedicated to elementary Ring Theory and consists of Chapters 7-11. The second part analyzes the main concepts, primary examples, fundamental constructions, as well as the basic results of the theory of, mainly commutative, rings. In this context, the text analyzes the basic theory of polynomial rings, principal ideal domains and unique factorization domains. The book sets the framework for the study of more advanced topics (Sylow theory, structure theorems of finitely generated or finite abelian groups, localization theory of rings, theory of non-commutative rings, etc.), which are outside the goals of the present book. The text is supplemented with two Appendices in which more advanced topics are briefly analyzed. Each Chapter is accompanied by a series of selected exercises, the total number of which approaches 500.

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