METADATA

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Abstract

The textbook is aimed at undergraduate students in the Mathematics Departments of domestic universities. Using the concept of group action on a set, Burnside's Theorem, the classical Sylow Theorems, and their applications are proven (for example, the simplicity of the alternating group An, for n equal to or greater than 5). The Class Equation is presented, and as an application, the maximum probability that two elements of a non-abelian group of order n will commute is determined. By introducing the concept of the direct product, finite abelian groups are classified. The Jordan-Hölder theory is developed, and as an application, concepts from the theory of solvable groups are presented. It is thoroughly proven that every group of order less than 60 is solvable. The textbook discusses the concept of group extension, the special case of the semidirect product, and as an application, it is shown that a group of order n is cyclic if and only if the numbers n and φ(n) (Euler's totient function) are coprime. Additionally, one chapter will refer to elementary group theory with an emphasis on the theory of symmetric groups Sn. Finally, a historical appendix will present elements of the classification of finite simple groups.

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