



METADATA

Title: Group Theory

Other Titles: Advanced group theory

Language: Greek

ISBN: 978-960-603-240-0

Subject: MATHEMATICS AND COMPUTER SCIENCE

Keywords: Groups / Classification / Solvability / Semidirect Products

Bibliographic Reference: Marmaridis, N. (2015). Group Theory [Undergraduate textbook]. Kallipos, Open Academic Editions. <http://dx.doi.org/10.57713/kallipos-671>

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 A_n , for $n \geq 5$). The Class Equation is presented, and as an application, the maximum probability that two elements of a non-abelian group of order n 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, shows that a group of order n is cyclic if and only if the numbers $\phi(n)$ and n (ϕ (Euler's totient function)) are coprime. Additionally, one chapter covers elementary group theory with an emphasis on the theory of symmetric groups S_n . Finally, a historical appendix presents key developments in the classification of finite simple groups.

