

# CONTEMPORARY ABSTRACT ALGEBRA



Seventh Edition

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## Part 2 Groups page 27-56

Definitions of **Binary Operation** , **Group**, Examples 1,2,3,4,5,6,7,8,9,10,11,12,13,15,17,18,19, Table 2.1, Elementary Properties of Groups: Theorem 2.1 (**Uniqueness of the identity**) with proof, Theorem 2.2 ( **Cancellation** ) with proof, Theorem 2.3 (**Uniqueness of Inverses** ) with proof, Table 2.2, Theorem 2.4 (**Socks-Shoes Property**) with proof.

Computer Exercises at <http://www.d.umn.edu/~jgallian>

**Exercises pages 52-55: 1,3,5,7,15,17,18,19,26 ,35**

## Part 3 Finite Groups; Subgroups page 57-71

Definitions **order of a group**, **order of an element**, Examples 1, 2,3, Definition of **Subgroup**, Theorem 3.1 (**One-step Subgroup Test**) with proof, Examples 4,5, Theorem 3.2 (**Two-Step Subgroups Test**) with proof, Example 6, Theorem 3.3 (**Finite Subgroup Test**) without proof, Examples of Subgroups (**Definition of Cyclic group**), Theorem 3.4 ( $\langle a \rangle$  is a subgroup) with proof, Example 7,8,9, Definition **center of a group** , Theorem 3.5 (**Center is a subgroup**) with proof, Definition **Centralizer of a in G**, Theorem 3.6 ( $C(a)$  is a subgroup) with proof, **Examples 10,11,12 (small project for students)**.

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**Exercises pages 64-65: 1,2,3,5,7,10,18,19,23,27,28,36,37,46,49,51,52,53,55**

## Part 4 Cyclic Groups pages 72-94

Properties of a Cyclic Groups, Examples 1, 2,3,4, Theorem 4.1 Criterion for  $a^i = a^j$  With proof, Corollaries 1, 2 , Theorem 4.2  $\langle a^k \rangle = \langle a^{\gcd(n,k)} \rangle$  without proof, Corollaries 1,2,3,4 without proofs. **Classification of Subgroups of Cyclic Groups** , Theorem 4.3 (**Fundamental Theorem of Cyclic Groups**) without proof, Example 5, Theorem 4.4 (Number of Elements of Each Order in a Cyclic Groups) without proof.

**Exercises pages 81-88: 1,2,3,5,7,8,9,10,11,18,19,21,22,26,29,32,34,38,44,45,59,62,64**

**Part 5 Permutation Groups pages 95-120**

Definitions **Permutation of A**, **Permutation Group of A**, Example 1 (**Symmetric Groups  $S_3$**  ), Example 2 (**Symmetric Groups  $S_n$**  ) Example 3 (**Symmetries of a square**), Cycle Notation, Properties of Permutations, Theorem 5.1 (Products of Disjoint Cycles) without proof, Theorem 5.2 (Disjoint Cycles Commute) without proof, Theorem 5.3 (Order of Permutation ) without proof, Theorem 5.4 (Product of 2-Cycles ), without proof, Examples 5,6, Lemma without proof, Theorem 5.5 (Always Even or Always Odd) without proof, Definition **Even and odd Permutations** , Theorem 5.6 (**Even Permutations Form a Group**) with proof, Definition **Alternating Group of Degree n**, Theorem 5.7 with proof . **Example 7 (small project for students)**

**Exercises pages 113-120: 1, 2,3,4,5,6,7,9,17,18,20,21,22,23,24,25,26,35,38**

**Part 6 Isomorphisms pages 122 – 136**

Definitions **Group Isomorphism**, **Homomorphisms**, Table 6.1, Examples 1,2,3,4, Theorem 6.1 (**Cayley's Theorem** ) with proof, Theorem 6.2 (**Properties of Isomorphisms Acting on Elements**) some of them with proofs, Theorem 6.3 (**Properties of Isomorphisms Acting on a Groups**) some of them with proofs, Definition **Automorphism** , Theorem 6.4 (**Aut(G) is a group**) the proof is left as an exercise.

**Exercises pages 133 – 136: 1, 2,3,4,5,8,10,20,24,27,29,34,38**

**Part 7 Cosets and Lagrange's Theorem pages 138-143**

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**Exercises pages 149-153: 1,2,3,57,13,27,31**

**Part 9 Normal Subgroups and Factor Groups 178-181**

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**Exercises pages 193-195: 1,2,4,7,12,13,14,17,21,55,56,57,60**

**Part 10 Group Homomorphisms 200-211**

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**Exercises pages 211 - 215: 1, 3, 5,8,24,39,40,49**

