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2.1.1 Definition of Sets; 2.1.2 Membership; 2.1.3 Specifications for a Set to Describe Shapes; 2.1.4 Special Sets; 2.2 Equality and Inclusion of Sets; 2.3 Some Operations on Sets; 2.3.1 The Power Set; 2.3.2 Set Union; 2.3.3 Set Intersection; 2.3.4 Set Difference; 2.3.5 Set Complement; 2.3.6 Symmetric Difference; 2.3.7 Venn Diagrams; 2.3.8 Cartesian Products; 2.4 Relations in Sets; 2.4.1 Fundamental Concepts; 2.4.2 The Properties of Binary Relations in a Set; 2.4.3 Equivalence Relations and Partitions; 2.4.4 Order Relations; 2.5 Functions, Mappings, and Operations; 2.5.1 Fundamental Concepts  
2.5.2 The Graphical Representations of a Function; 2.5.3 The Range of a Function, and Various Categories of Function; 2.5.4 Composition of Functions; 2.5.5 The Inverse Function; 2.5.6 The One-to-One Onto Function and Set Isomorphism; 2.5.7 Equivalence Relations and Functions; 2.5.8 Functions of Many Variables, n-ary Operations; 2.5.9 A Special Type of Function: The Analytic Function; 3 Algebraic Structures for Shape Description; 3.1 What is an Algebraic Structure?; 3.1.1 Algebraic Systems with Internal Composition Laws; 3.1.2 Algebraic Systems with External Composition Laws  
3.2 Properties of Algebraic Systems; 3.2.1 Associativity; 3.2.2 Commutativity; 3.2.3 Distributivity; 3.2.4 The Existence of the Identity/Unit Element; 3.2.5 The Existence of an Inverse Element; 3.3 Morphisms of Algebraic Systems; 3.4 Semigroups and Monoids: Two Simple Algebraic Systems; 3.5 Groups; 3.5.1 Fundamentals; 3.5.2 The Advantages of Identifying a System as a Group; 3.5.3 Transformation Groups; 3.6 Symmetry Groups; 3.6.1 The Action of a Group on a Set; 3.6.2 Translations and the Euclidean Group; 3.6.3 The Matrix Group; 3.7 Proper Rotations of Regular Solids  
3.7.1 The Symmetry Groups of the Regular Solids

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### Sommario/riassunto

Image processing problems are often not well defined because real images are contaminated with noise and other uncertain factors. In Mathematics of Shape Description, the authors take a mathematical approach to address these problems using the morphological and set-theoretic approach to image processing and computer graphics by presenting a simple shape model using two basic shape operators called Minkowski addition and decomposition. This book is ideal for professional researchers and engineers in Information Processing, Image Measurement, Shape Description, Shape Representation and

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