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2.6. n-Dimensional Space2.7. Complex Numbers; 2.8. Functions and Graphs; Problems; 3 Metric Spaces; 3.1. Definitions and Examples; 3.2. Open Sets; 3.3. Convergent Sequences and Homeomorphisms; 3.4. Limit Points; 3.5. Closed Sets; 3.6. Dense Sets and Closures; 3.7. Complete Metric Spaces; 3.8. Completion of a Metric Space; 3.9. Compactness; Problems; 4 Limits; 4.1. Basic Concepts; 4.2. Some General Theorems; 4.3. Limits of Numerical Functions; 4.4. Upper and Lower Limits; 4.5. Nondecreasing and Nonincreasing Functions; 4.6. Limits of Numerical Sequences; 4.7. Limits of Vector Functions Problems5 Continuous Functions; 5.1. Continuous Functions on a Metric Space; 5.2. Continuous Numerical Functions on the Real Line; 5.3. Monotonie Functions; 5.4. The Logarithm; 5.5. The Exponential; 5.6. Trigonometric Functions; 5.7. Applications of Trigonometric Functions; 5.8. Continuous Vector Functions of a Vector Variable; 5.9. Sequences of Functions; Problems; 6 Series; 6.1. Numerical Series; 6.2. Absolute and Conditional Convergence; 6.3. Operations on Series; 6.4. Series of Vectors; 6.5. Series of Functions; 6.6. Power Series; Problems; 7 The Derivative; 7.1. Definitions and Examples
7.2. Properties of Differentiable Functions7.3. The Differential; 7.4. Mean Value Theorems; 7.5. Concavity and Inflection Points; 7.6. L'Hospital's Rules; Problems; 8 Higher Derivatives; 8.1. Definitions and Examples; 8.2. Taylor's Formula; 8.3. More on Concavity and Inflection Points; 8.4. Another Version of Taylor's Formula; 8.5. Taylor Series; 8.6. Complex Exponentials and Trigonometric Functions; 8.7. Hyperbolic Functions; Problems; 9 The Integral; 9.1. Definitions and Basic Properties; 9.2. Area and Arc Length; 9.3. Antiderivatives and Indefinite Integrals
9.4. Technique of Indefinite Integration9.5. Evaluation of Definite Integrals; 9.6. More on Area; 9.7. More on Arc Length; 9.8. Area of a Surface of Revolution; 9.9. Further Applications of Integration; 9.10. Integration of Sequences of Functions; 9.11. Parameter-Dependent Integrals; 9.12. Line Integrals; Problems; 10 Analytic Functions; 10.1. Basic Concepts; 10.2. Line Integrals of Complex Functions; 10.3. Cauchy's Theorem and Its Consequences; 10.4. Residues and Isolated Singular Points; 10.5. Mappings and Elementary Functions; Problems; 11 Improper Integrals
11.1. Improper Integrals of the First Kind

Sommario/riassunto

In this book the renowned Russian mathematician Georgi E. Shilov brings his unique perspective to real and complex analysis, an area of perennial interest in mathematics. Although there are many books available on the topic, the present work is specially designed for undergraduates in mathematics, science and engineering. A high level of mathematical sophistication is not required.The book begins with a systematic study of real numbers, understood to be a set of objects satisfying certain definite axioms. The concepts of a mathematical structure and an isomorphism are introduced in Chapter 2,