

CONTENTS

<i>Preface to the Enlarged and Corrected Printing</i>	v
<i>Preface</i>	ix
<i>Notations</i>	xv
Chapter I	
ELEMENTS OF THE THEORY OF SETS	1
1. Elements and sets. 2. Boolean algebra. 3. Product of two sets. 4. Mappings. 5. Direct and inverse images. 6. Surjective, injective, and bijective mappings. 7. Composition of mappings. 8. Families of elements. Union, intersection, and products of families of sets. Equivalence relations. 9. Denumerable sets.	
Chapter II	
REAL NUMBERS	16
1. Axioms of the real numbers. 2. Order properties of the real numbers. 3. Least upper bound and greatest lower bound.	
Chapter III	
METRIC SPACES	27
1. Distances and metric spaces. 2. Examples of distances. 3. Isometries. 4. Balls, spheres, diameter. 5. Open sets. 6. Neighborhoods. 7. Interior of a set. 8. Closed sets, cluster points, closure of a set. 9. Dense subsets; separable spaces. 10. Subspaces of a metric space. 11. Continuous mappings. 12. Homeo- morphisms. Equivalent distances. 13. Limits. 14. Cauchy sequences, complete spaces. 15. Elementary extension theorems. 16. Compact spaces. 17. Compact sets. 18. Locally compact spaces. 19. Connected spaces and connected sets. 20. Product of two metric spaces.	
Chapter IV	
ADDITIONAL PROPERTIES OF THE REAL LINE	79
1. Continuity of algebraic operations. 2. Monotone functions. 3. Logarithms and exponentials. 4. Complex numbers. 5. The Tietze–Urysohn extension theorem.	

Chapter V	
NORMED SPACES	91
1. Normed spaces and Banach spaces. 2. Series in a normed space. 3. Absolutely convergent series. 4. Subspaces and finite products of normed spaces. 5. Condition of continuity of a multilinear mapping. 6. Equivalent norms. 7. Spaces of continuous multilinear mappings. 8. Closed hyperplanes and continuous linear forms. 9. Finite dimensional normed spaces. 10. Separable normed spaces.	
 Chapter VI	
HILBERT SPACES	115
1. Hermitian forms. 2. Positive hermitian forms. 3. Orthogonal projection on a complete subspace. 4. Hilbert sum of Hilbert spaces. 5. Orthonormal systems. 6. Orthonormalization.	
 Chapter VII	
SPACES OF CONTINUOUS FUNCTIONS	132
1. Spaces of bounded functions. 2. Spaces of bounded continuous functions. 3. The Stone–Weierstrass approximation theorem. 4. Applications. 5. Equicontinuous sets. 6. Regulated functions.	
 Chapter VIII	
DIFFERENTIAL CALCULUS	147
1. Derivative of a continuous mapping. 2. Formal rules of derivation. 3. Derivatives in spaces of continuous linear functions. 4. Derivatives of functions of one variable. 5. The mean value theorem. 6. Applications of the mean value theorem. 7. Primitives and integrals. 8. Application: the number e . 9. Partial derivatives. 10. Jacobians. 11. Derivative of an integral depending on a parameter. 12. Higher derivatives. 13. Differential operators. 14. Taylor’s formula.	
 Chapter IX	
ANALYTIC FUNCTIONS	197
1. Power series. 2. Substitution of power series in a power series. 3. Analytic functions. 4. The principle of analytic continuation. 5. Examples of analytic functions; the exponential function; the number π . 6. Integration along a road. 7. Primitive of an analytic function in a simply connected domain. 8. Index of a point with respect to a circuit. 9. The Cauchy formula. 10. Characterization of analytic functions of complex variables. 11. Liouville’s theorem. 12. Convergent sequences of analytic functions. 13. Equicontinuous sets of analytic functions. 14. The Laurent series. 15. Isolated singular points; poles; zeros; residues. 16. The theorem of residues. 17. Meromorphic functions.	
 Appendix to Chapter IX	
APPLICATION OF ANALYTIC FUNCTIONS TO PLANE TOPOLOGY	251
1. Index of a point with respect to a loop. 2. Essential mappings in the unit circle. 3. Cuts of the plane. 4. Simple arcs and simple closed curves.	

Chapter X**EXISTENCE THEOREMS 264**

1. The method of successive approximations. 2. Implicit functions. 3. The rank theorem. 4. Differential equations. 5. Comparison of solutions of differential equations. 6. Linear differential equations. 7. Dependence of the solution on parameters. 8. Dependence of the solution on initial conditions. 9. The theorem of Frobenius.

Chapter XI**ELEMENTARY SPECTRAL THEORY 312**

1. Spectrum of a continuous operator. 2. Compact operators. 3. The theory of F. Riesz. 4. Spectrum of a compact operator. 5. Compact operators in Hilbert spaces. 6. The Fredholm integral equation. 7. The Sturm–Liouville problem.

Appendix**ELEMENTS OF LINEAR ALGEBRA 358**

1. Vector spaces. 2. Linear mappings. 3. Direct sums of subspaces. 4. Bases. Dimension and codimension. 5. Matrices. 6. Multilinear mappings. Determinants. 7. Minors of a determinant.

References 380

Index 381