- Preface
- 1 Fourier Series Piecewise Continuous Functions
- Fourier Cosine Series Examples Fourier Sine Series Examples Fourier Series Examples
- Adaptations to Other Intervals
- 2 Convergence of Fourier Series One-Sided Derivatives
- A Property of Fourier Coefficients Two Lemmas
- A Fourier Theorem
- Discussion of the Theorem and Its Corollary Convergence on Other Intervals
- A Lemma Absolute and Uniform Convergence of Fourier Series
- Differentiation of Fourier Series
- Integration of Fourier Series
- 3 Partial Differential Equations of Physics
- Linear Boundary Value Problems
- One-Dimensional Heat Equation
- Related Equations Laplacian in Cylindrical and Spherical Coordinates
- Derivations Boundary Conditions
- A Vibrating String
- Vibrations of Bars and Membranes
- General Solution of the Wave Equation
- Types of Equations and Boundary Equations
- 4 The Fourier Method
- Linear Operators
- Principle of Superposition
- A Temperature Problem
- A Vibrating String Problem
- Historical Development
- 5 Boundary Value Problems
- A Slab with Faces at Prescribed Temperatures Related Problems
- A Slab with Internally Generated Heat Steady
- Temperatures in a Rectangular Plate Cylindrical Coordinates
- A String with Prescribed Initial Conditions
- Resonance An Elastic Bar
- Double Fourier Series
- Periodic Boundary Conditions
- 6 Fourier Integrals and Applications
- The Fourier Integral Formula
- Dirichlet's Integral Two Lemmas
- A Fourier Integral Theorem
- The Cosine and Sine Integrals
- More on Superposition of Solutions
- Temperatures in a Semi-Infinite
- Solid Temperatures in an Unlimited Medium
- 7 Orthonormal Sets
- Inner Products and Orthonormal Sets Examples
- Generalized Fourier Series Examples

- Best Approximation in the Mean Bessel's Inequality and Parseval's Equation
- Applications to Fourier Series
- 8 Sturm-Liouville Problems and Applications
- Regular Sturm-Liouville Problems
- Modifications Orthogonality of Eigenfunctions
- Real-Valued Eigenfunctions and Nonnegative
- Eigenvalues Methods of Solution
- Examples of Eigenfunction Expansions
- A Temperature Problem in Rectangular Coordinates
- Another Problem Other Coordinates
- A Modification of the Method
- Another Modification
- A Vertically Hung Elastic Bar
- 9 Bessel Functions and Applications
- Bessel Functions J n (x)
- General Solutions of Bessel's Equation
- Recurrence Relations
- Bessel's Integral Form
- Some Consequences of the Integral Forms
- The Zeros of J n (x)
- Zeros of Related Functions
- Orthogonal Sets of Bessel Functions
- Proof of the Theorems
- The Orthonormal Functions
- Fourier-Bessel Series Examples
- Temperatures in a Long Cylinder
- Internally Generated Heat Vibration of a Circular Membrane
- 10 Legendre Polynomials and Applications
- Solutions of Legendre's Equation vLegendre Polynomials
- Orthogonality of Legendre Polynomials Rodrigues'
- Formula and Norms Legendre Series
- The Eigenfunctions P n (cos ¿)
- Dirichlet Problems in Spherical Regions
- Steady Temperatures in a Hemisphere
- 11 Verification of Solutions and Uniqueness
- Abel's Test for Uniform Convergence
- Verification of Solution of Temperature Problem
- Uniqueness of Solutions of the Heat Equation
- Verification of Solution of Vibrating String Problem
- Uniqueness of Solutions of the Wave Equation
- Appendixes
- Bibliography
- Some Fourier Series Expansions
- Solutions of Some Regular Sturm-Liouville Problems
- Index