Table of Contents

- 1 Functions and Models
- Four Ways to Represent a Function
- Mathematical Models: A Catalog of Essential Functions
- New Functions from Old Functions
- Graphing Calculators and Computers
- Review
- Principles of Problem Solving
- 2 Limits
- The Tangent and Velocity Problems
- The Limit of a Function
- Calculating Limits Using the Limit Laws
- The Precise Definition of a Limit
- Continuity
- Review
- Problems Plus
- 3 Derivatives
- Derivatives and Rates of Change
- Writing Project: Early Methods for Finding Tangents
- The Derivative as a Function
- Differentiation Formulas
- Applied Project: Building a Better Roller Coaster
- Derivatives of Trigonometric Functions
- The Chain Rule
- Applied Project: Where Should a Pilot Start Descent? Implicit Differentiation
- Rates of Change in the Natural and Social Sciences
- Related Rates
- Linear Approximations and Differentials
- Laboratory Project: Taylor Polynomials
- Review
- Problems Plus
- 4 Applications Of Differentiation
- Maximum and Minimum Values
- Applied Project: The Calculus of Rainbows
- The Mean Value Theorem
- How Derivatives Affect the Shape of a Graph
- Limits at Infinity
- Horizontal Asymptotes
- Summary of Curve Sketching
- Graphing with Calculus and Calculators
- Optimization Problems
- Applied Project: The Shape of a Can
- Newton's Method
- Antiderivatives
- Review

- Problems Plus
- 5 Integrals
- Areas and Distances
- The Definite Integral
- Discovery Project: Area Functions
- The Fundamental Theorem of Calculus
- Indefinite Integrals and the Net Change Theorem
- Writing Project: Newton, Leibniz, and the Invention of Calculus
- The Substitution Rule
- Review
- Problems Plus
- 6 Applications Of Integration
- Areas between Curves
- Volume
- Volumes by Cylindrical Shells
- Work
- Average Value of a Function
- Review
- Problems Plus
- 7 Inverse Functions: Exponential, Logarithmic, and Inverse Trigonometric Functions
- Inverse Functions. (Instructors may cover either Sections 7.2-7.4 or Sections 7.2\*-7.4\*. See the Preface.)
- Exponential Functions and Their Derivatives
- Logarithmic Functions
- Derivatives of Logarithmic Functions
- The Natural Logarithmic Function
- The Natural Exponential Function
- General Logarithmic and Exponential Functions
- Exponential Growth and Decay
- Inverse Trigonometric Functions
- Applied Project: Where to Sit at the Movies
- Hyperbolic Functions
- Indeterminate Forms and L'Hospital's Rule
- Writing Project: The Origins of L'Hospital's Rule
- Review
- Problems Plus
- 8 Techniques Of Integration
- Integration by Parts
- Trigonometric Integrals
- Trigonometric Substitution
- Integration of Rational Functions by Partial Fractions
- Strategy for Integration
- Integration Using Tables and Computer Algebra Systems
- Discovery Project: Patterns in Integrals
- Approximate Integration
- Improper Integrals

- Review
- Problems Plus
- 9 Further Applications Of Integration
- Arc Length
- Discovery Project: Arc Length Contest
- Area of a Surface of Revolution
- Discovery Project: Rotating on a Slant
- Applications to Physics and Engineering
- Discovery Project: Complementary Coffee Cups
- Applications to Economics and Biology
- Probability
- Review
- Problems Plus
- 10 Differential Equations
- Modeling with Differential Equations
- Direction Fields and Euler's Method
- Separable Equations
- Applied Project: Which is Faster, Going Up or Coming Down? Models for Population Growth
- Applied Project: Calculus and Baseball
- Linear Equations
- Predator-Prey Systems
- Review
- Problems Plus
- 11 Parametric Equations and Polar Coordinates
- Curves Defined by Parametric Equations
- Laboratory Project: Families of Hypocycloids
- Calculus with Parametric Curves
- Laboratory Project: Bezier Curves
- Polar Coordinates
- Areas and Lengths in Polar Coordinates
- Conic Sections
- Conic Sections in Polar Coordinates
- Review
- Problems Plus
- 12 Infinite Sequences and Series
- Sequences
- Laboratory Project: Logistic Sequences
- Series
- The Integral Test and Estimates of Sums
- The Comparison Tests
- Alternating Series
- Absolute Convergence and the Ratio and