# Contents

Preface	vii
How to Use this Book: A Note to the Student	xi
Chapter 13 Vectors	
13.1 Vectors in the Plane	645
13.2 Vectors in Space	652
13.3 Lines and Distance	660
13.4 The Dot Product	668
13.5 The Cross Product	677
13.5 Matrices and Determinants	683
Chapter 14 Curves and Surfaces	
14.1 The Conic Sections	695
14.2 Translation and Rotation of Axes	703
14.3 Functions, Graphs, and Level Surfaces	710
14.4 Quadric Surfaces	719
14.5 Cylindrical and Spherical Coordinates	728
14.6 Curves in Space	735
14.7 The Geometry and Physics of Space Curves	745
Chapter 15 Partial Differentiation	
15.1 Introduction to Partial Derivatives	765
15.2 Linear Approximations and Tangent Planes	775
15.3 The Chain Rule	779
15.4 Matrix Multiplication and the Chain Rule	784

Ó

#### Chapter 16 Gradients, Maxima, and Minima

16.1	Gradients and Directional Derivatives	797
16.2	Gradients, Level Surfaces, and Implicit	
	Differentiation	805
16.3	Maxima and Minima	812
16.4	Constrained Extrema and Lagrange Multipliers	825

### Chapter 17 Multiple Integration

17.1 The Double Integral and Iterated Integral	839
17.2 The Double Integral Over General Regions	847
17.3 Applications of the Double Integral	853
17.4 Triple Integrals	860
17.5 Integrals in Polar, Cylindrical, and Spherical	
Coordinates	869
17.6 Applications of Triple Integrals	876
Chapter 18	
Vector Analysis	
18.1 Line Integrals	885
18.2 Path Independence	895
18.3 Exact Differentials	901
18.4 Green's Theorem	908
18.5 Circulation and Stokes' Theorem	914
18.6 Flux and the Divergence Theorem	924
Answers	A.69

## **Contents of Volume I**

Introduction Orientation Quizzes

Chapter R Review of Fundamentals

Chapter 1 Derivatives and Limits

Chapter 2 Rates of Change and the Chain Rule

Chapter 3 Graphing and Maximum–Minimum Problems

Chapter 4 The Integral

Chapter 5 Trigonometric Functions

Chapter 6 Exponentials and Logarithms

## **Contents of Volume II**

Chapter 7 Basic Methods of Integration

Chapter 8 Differential Equations

Chapter 9 Applications of Integration

Chapter 10 Further Techniques and Applications of Integration

Chapter 11 Limits, L'Hôpital's Rule, and Numerical Methods

Chapter 12 Infinite Series