CONTENTS

PREFACE vi

PART I **Prologue**

1 Basic Properties of Numbers 3
2 Numbers of Various Sorts 21

PART II **Foundations**

3 Functions 39
Appendix. Ordered Pairs 54
4 Graphs 56
Appendix 1. Vectors 75
Appendix 2. The Conic Sections 80
Appendix 3. Polar Coordinates 84
5 Limits 90
6 Continuous Functions 113
7 Three Hard Theorems 120
8 Least Upper Bounds 131
Appendix. Uniform Continuity 142

PART III **Derivatives and Integrals**

9 Derivatives 147
10 Differentiation 166
11 Significance of the Derivative 185
Appendix. Convexity and Concavity 216
12 Inverse Functions 227
Appendix. Parametric Representation of Curves 241
13 Integrals 250
Appendix. Riemann Sums 279
14 The Fundamental Theorem of Calculus 282

15 The Trigonometric Functions 300
*16 π is Irrational 321
*17 Planetary Motion 327
18 The Logarithm and Exponential Functions 336
19 Integration in Elementary Terms 359
Appendix. The Cosmopolitan Integral 397

PART IV Infinite Sequences and Infinite Series

20 Approximation by Polynomial Functions 405
*21 *e* is Transcendental 435
22 Infinite Sequences 445
23 Infinite Series 464
24 Uniform Convergence and Power Series 491
25 Complex Numbers 517
26 Complex Functions 532
27 Complex Power Series 546

PART V Epilogue

28 Fields 571
29 Construction of the Real Numbers 578
30 Uniqueness of the Real Numbers 591
Suggested Reading 599
Answers (to selected problems) 609
Glossary of Symbols 655
Index 659