

TABLE OF CONTENTS

Preface.....	i
Table of Contents	iii
Section I	
Chapter 1: Getting Started	3
Getting Started, 3	
AP Central, 4	
The AP Calculus Community , 7	
Other Resources, 8	
Chapter 2: AP Calculus	10
Philosophy, 10	
Goals, 12	
The Rule of Four, 13	
Chapter 3: Your AP Calculus Class:	16
Vertical Teaming, 17	
Open Enrollment, 17	
Equity and Access, 18	
Recruiting, 18	
AP Statistics, 19	
Scheduling, 19	
Pacing, 20	
Homework and Grading, 24	
Chapter 4: Technology	26
Graphing Calculators, 26	
Decimals, Arithmetic and Rounding, 28	
Permitted Calculator Models, 31	
Calculator Programs, 31	
Other Technology, 32	
Chapter 5 Mathematics Before AP Calculus.....	35
The Elementary Functions, 36	
The Properties, Algebra, and Graphs of Functions, 37	
Definitions, Theorems and Logic, 38	
The Equation of a Line, 41	
Section 2	
Chapter 6: Limits & Continuity	45
Intuitive Limits , 46	

The Definitions of Continuity, 46	
Types of Discontinuities, 47	
Calculating Limits Using Algebra, 49	
Dominance, 49	
Infinity, 50	
Chapter 7: The Derivative.....	53
Average Rate of Change of a Function, 54	
The Slope of a Line Tangent to a Graph, 55	
Difference Quotients, 57	
The Tangent Line, 58	
The Derivative as a Function, 59	
Differentiability Implies Continuity, 61	
Higher Order Derivative, 61	
Verbal Considerations and Units, 62	
The Exams and a Reversal Problem, 63	
Chapter 8: Computing Derivatives	71
Basic Formulas, 71	
Notes on Teaching Some of these Rules, 72	
Implicit Differentiation, 77	
Finding the Derivatives of a Function's Inverse, 79	
Derivative by Calculator, 82	
Memorization, 83	
Chapter 9: Derivative Applications - Graphs.....	85
The Shapes of a Graph , 85	
Joining the Shapes – Extreme Values, 86	
Joining the Shapes – Points of Inflection, 88	
Reading the Graph of the Derivative, 88	
Linear Motion, 89	
Chapter 10: Other Derivative Applications.....	103
The Mean Value Theorem, 103	
Optimization, 108	
Related Rate Problems, 109	
L'Hôpital's Rule, 110	
Chapter 11: Integral Calculus	118
Order of Topics, 118	
Beginning Integration, 119	
Riemann Sums, 120	
Definition of the Definite Integral, 123	
Numerical Integration, 124	
Properties of Definite Integrals, 125	
Chapter 12: The Fundamental Theorem of Calculus	131
Areas without “Calculus”, 131	
Using Geometry, 132	
Finding the Net Change, 133	
The Fundamental Theorem of Calculus, 135	

Chapter 13: Indefinite Integrals & Antidifferentiation.....	137
Techniques of Antidifferentiation, 137	
The Change of Variable Theorem, 140	
Additional Integration Topics for BC Students, 140	
Chapter 14: Functions Defined by Integrals	147
Introducing Functions Defined by Integrals, 147	
The Fundamental Theorem of Calculus, 149	
Accumulation and the Graphs of f , f' and f'' , 152	
Rate and Accumulation Questions, 156	
Chapter 15: Applications of Integrals	162
Area, 163	
Volumes of Solids with Regular Cross-Sections, 164	
Average Value of a Function, 166	
Chapter 16: Differential Equations	176
The Basics, 176	
Separable Differential Equations, 178	
Exponential Growth-decay Model, 180	
The Logistic Growth Model (BC only), 180	
Slope Fields, 182	
Euler's Method (BC Only), 184	
Chapter 17: Sequences & Series (BC Topics)	191
Sequences and Series, 192	
Some Useful Series, 193	
Geometric Series, 193	
Convergence Tests, 195	
Absolute Convergence, 197	
Chapter 18: Power Series (BC Topics)	200
Building a Polynomial that Approximates a Function:, 200	
The Taylor and Maclaurin Series, 204	
The Radius and Interval of Convergence, 204	
New Series from Old, 206	
Error Bounds: How Good is Your Approximation? , 207	
The Importance of Taylor Series., 210	
Chapter 19: Parametric, Vector, and Polar Function (BC Topics)	214
Vectors, 215	
Polar Curves, 217	
Chapter 20: Writing & Explaining.....	220
Good Writing, 221	
Justify Your Answer – Give a Reason for your Answer, 222	
Explain the Meaning – Interpret your Answer, 224	
Other Things that Require Explanations, 225	
Section 3	227
Chapter 21: The Exams & Exam Scoring.....	229
How the Exams are Developed, 229	
The Exam Format , 230	

Cut Points and Scores, 231	
Scoring the Exams, 232	
Reading a Scoring Standard, 235	
Preparing Your Students for the AP Exams, 243	
Chapter 22: “Type” Problems	244
Type 1: Rate & Accumulation, 245	
Type 2: Particle Moving on a Line, 246	
Type 3: Interpreting Graphs, 247	
Type 4: Area – Volume, 248	
Type 5: Table Questions, 249	
Type 6: Differential Equations, 250	
Type 7: Occasional Topics, 251	
Type 8: Parametric and Vector Questions (a BC topic), 252	
Type 9: Polar Equations (a BC topic), 252	
Type 10: Sequences and Series (a BC topic), 253	
Chapter 23: For your Students	255
How, not only to Survive the AP Calculus exam, but to Prevail..., 255	
Appendix	263
Appendix 1: Topics	263
Appendix 2: Teaching the Formal Definition of Limit	268
Appendix 3: Graph Cards	275
Appendix 4: Calculator Programs.....	285
Endnotes.....	287