

Contents

I	Algebra and Elementary Notions of Functions	1
1	Various Functions, Coordinate Systems; Graphing	1
2	Equations of the First Degree; Determinants	6
3	Equations of the Second Degree; Imaginaries	12
4	Functions of a Complex Variable	16
5	The General Cubic; the Binomial Theorem	23
6	Arithmetic and Geometric Series	28
	Exercises	30
II	Differentiation	44
1	Review: Maxima and Minima; Implicit Differentiation	44
2	The Newton–Raphson Method	54
3	Partial Differentiation	57
	DIGRESSION INTO THERMODYNAMICS	61
4	Method of Lagrangian Multipliers	68
5	Differentiation of an Indefinite Integral	73
6*	Differentiation of Functions of a Complex Variable	74
	Exercises	79
III	Techniques of Integration	92
1	Review of Elementary Tricks	92
2	Reduction Formulas; Introduction of Complex Variables	110
	DIGRESSION INTO HYPERBOLIC FUNCTIONS*	
3	Parameter Differentiation	117
4	Definite Integrals; Numerical Integration	120

5	Line Integrals	128
6*	Fourier Transforms	135
	Exercises	148
IV	Expansions in Series	163
1	Series in General	163
2	Maclaurin's and Taylor's series	167
3	Familiar Series	181
4*	Euler–Maclaurin Summation Formula; Stirling's Approximation	189
5	Fourier Series	196
	Exercises	208
V	Differential Equations	218
1	Some First-Order Types	218
2	The Laplace Transform	234
3	Some Second-Order Types and Power Series Solutions	243
4	Partial Differential Equations	255
	Exercises	266
VI	Matrices, Vectors, and Tensors	279
	MATRICES	
1	Types of and Operations with Matrices	279
2	Matrices as Operators; Transrotation	288
	Exercises	305
	VECTORS AND TENSORS	
3	Addition, Multiplication, and Differentiation of Vectors	308
4	Gradient, Divergence, Curl, and Laplacian	321
5*	Orthogonal Coordinate Systems	332
6	Cartesian Tensors	345
	Exercises	360
VII	Special Functions	371
1	The Error, Gamma, and Beta Functions	371
2	Legendre and Laguerre Polynomials	382

3	Bessel Functions	395
4	The Dirac Delta Function	404
	Exercises	412
	Annotated Bibliography	421
	Author Index	427
	Subject Index	431