CONTENTS

Preface v

CHAPTER 1 Ordinary Differential Equations 1
- 1-1 Solution in closed form 1
- 1-2 Power-series solutions 12
- 1-3 Miscellaneous approximate methods 21
- 1-4 The WKB Method 26

CHAPTER 2 Infinite Series 43
- 2-1 Convergence criteria 43
- 2-2 Familiar series 46
- 2-3 Transformation of series 48

CHAPTER 3 Evaluation of Integrals 56
- 3-1 Elementary methods 56
- 3-2 Use of symmetry arguments 59
- 3-3 Contour integration 63
- 3-4 Tabulated integrals 71
- 3-5 Approximate expansions 75
- 3-6 Saddle-point methods 78

CHAPTER 4 Integral Transforms 91
- 4-1 Fourier series 91
- 4-2 Fourier transforms 96
- 4-3 Laplace transforms 102
- 4-4 Other transform pairs 104
- 4-5 Applications of integral transforms 105

CHAPTER	**5**	**Further Applications of Complex Variables**	118
	5-1	Conformal transformations	118
	5-2	Dispersion relations	123
CHAPTER	**6**	**Vectors and Matrices**	134
	6-1	Linear vector spaces	134
	6-2	Linear operators	136
	6-3	Matrices	138
	6-4	Coordinate transformations	142
	6-5	Eigenvalue problems	145
	6-6	Diagonalization of matrices	153
	6-7	Spaces of infinite dimensionality	155
CHAPTER	**7**	**Special Functions**	162
	7-1	Legendre functions	162
	7-2	Bessel functions	171
	7-3	Hypergeometric function	180
	7-4	Confluent hypergeometric functions	186
	7-5	Mathieu functions	189
	7-6	Elliptic functions	196
CHAPTER	**8**	**Partial Differential Equations**	208
	8-1	Examples	208
	8-2	General discussion	210
	8-3	Separation of variables	218
	8-4	Integral transform methods	228
	8-5	Wiener–Hopf method	234
CHAPTER	**9**	**Eigenfunctions, Eigenvalues, and Green's Functions**	248
	9-1	Simple examples of eigenvalue problems	248
	9-2	General discussion	250
	9-3	Solutions of boundary-value problems as eigenfunction expansions	254
	9-4	Inhomogeneous problems. Green's functions	255
	9-5	Green's functions in electrodynamics	265
CHAPTER	**10**	**Perturbation Theory**	273
	10-1	Conventional nondegenerate theory	273
	10-2	A rearranged series	279
	10-3	Degenerate perturbation theory	280

CHAPTER 11	**Integral Equations**	285
11-1	Classification	285
11-2	Degenerate kernels	286
11-3	Neumann and Fredholm series	288
11-4	Schmidt–Hilbert theory	292
11-5	Miscellaneous devices	297
11-6	Integral equations in dispersion theory	299
CHAPTER 12	**Calculus of Variations**	304
12-1	Euler–Lagrange equation	304
12-2	Generalization of the basic problem	309
12-3	Connections between eigenvalue problems and the calculus of variations	315
CHAPTER 13	**Numerical Methods**	327
13-1	Interpolation	327
13-2	Numerical integration	331
13-3	Numerical solution of differential equations	335
13-4	Roots of equations	338
13-5	Summing series	341
CHAPTER 14	**Probability and Statistics**	349
14-1	Introduction	349
14-2	Fundamental probability laws	350
14-3	Combinations and permutations	352
14-4	The binomial, Poisson, and Gaussian distributions	354
14-5	General properties of distributions	357
14-6	Fitting of experimental data	361
CHAPTER 15	**Tensor Analysis and Differential Geometry**	374
15-1	Cartesian tensors in three-space	374
15-2	Curves in three-space; Frenet formulas	380
15-3	General tensor analysis	382
CHAPTER 16	**Introduction to Groups and Group Representations**	396
16-1	Introduction; definitions	396
16-2	Subgroups and classes	399
16-3	Group representations	401
16-4	Characters	404
16-5	Physical applications	412
16-6	Infinite groups	421
16-7	Irreducible representations of $SU(2)$, $SU(3)$, and $O^+(3)$	430

APPENDIX **Some Properties of Functions of a Complex Variable** 445

A-1 Functions of a complex variable. Mappings 445

A-2 Analytic functions 451

Bibliography 459

Index 465