



UNIVERSIDAD NACIONAL DE ENTRE RÍOS
FACULTAD DE INGENIERIA
CENTRO DE MEDIOS
BIBLIOTECA

CONTENTS

Nº 1 733

PREFACE xi

CHAPTER 1

ANALYTIC FUNCTIONS	1
1.1 INTRODUCTION TO COMPLEX NUMBERS	1
1.2 PROPERTIES OF COMPLEX NUMBERS	12
1.3 SOME ELEMENTARY FUNCTIONS	27
1.4 CONTINUOUS FUNCTIONS	44
1.5 ANALYTIC FUNCTIONS	65
1.6 DIFFERENTIATION OF THE ELEMENTARY FUNCTIONS	90
REVIEW EXERCISES FOR CHAPTER 1	99

CHAPTER 2

CAUCHY'S THEOREM	102
2.1 CONTOUR INTEGRALS	102
SUPPLEMENT: RIEMANN SUMS	117
2.2 CAUCHY'S THEOREM: INTUITIVE VERSION	120
2.3 CAUCHY'S THEOREM: PRECISE VERSION	133
SUPPLEMENT A: INTEGRALS ALONG CONTINUOUS CURVES	154
SUPPLEMENT B: RELATIONSHIP OF CAUCHY'S THEOREM TO THE JORDAN CURVE THEOREM	158

2.4 CAUCHY'S INTEGRAL FORMULA	164
2.5 MAXIMUM MODULUS THEOREM AND HARMONIC FUNCTION	185
REVIEW EXERCISES FOR CHAPTER 2	201

CHAPTER 3

SERIES REPRESENTATION OF ANALYTIC FUNCTIONS	205
3.1 CONVERGENT SERIES OF ANALYTIC FUNCTIONS	206
3.2 POWER SERIES AND TAYLOR'S THEOREM	228
3.3 LAURENT'S SERIES AND CLASSIFICATION OF SINGULARITIES	246
REVIEW EXERCISES FOR CHAPTER 3	261

CHAPTER 4

CALCULUS OF RESIDUES	266
4.1 CALCULATION OF RESIDUES	266
4.2 THE RESIDUE THEOREM	280
4.3 EVALUATION OF DEFINITE INTEGRALS	294
4.4 EVALUATION OF INFINITE SERIES AND PARTIAL-FRACTION EXPANSIONS	329
REVIEW EXERCISES FOR CHAPTER 4	339

CHAPTER 5

CONFORMAL MAPPINGS	345
5.1 BASIC THEORY OF CONFORMAL MAPPINGS	345
5.2 FRACTIONAL LINEAR AND SCHWARZ-CHRISTOFFEL TRANSFORMATIONS	353
5.3 APPLICATIONS OF CONFORMAL MAPPING TO LAPLACE'S EQUATION, HEAT CONDUCTION, ELECTROSTATICS, AND HYDRODYNAMICS	374
REVIEW EXERCISES FOR CHAPTER 5	391

CHAPTER 6**FURTHER DEVELOPMENT OF THE THEORY 397**

- 6.1 ANALYTIC CONTINUATION AND ELEMENTARY RIEMANN SURFACES 397
- 6.2 ROUCHÉ'S THEOREM AND THE PRINCIPLE OF THE ARGUMENT 417
- 6.3 MAPPING PROPERTIES OF ANALYTIC FUNCTIONS 433
- SUPPLEMENT A: NORMAL FAMILIES AND THE RIEMANN MAPPING THEOREM 440
- SUPPLEMENT B: THE DYNAMICS OF COMPLEX ANALYTIC MAPPINGS 446
- REVIEW EXERCISES FOR CHAPTER 6 449

CHAPTER 7**ASYMPTOTIC METHODS 454**

- 7.1 INFINITE PRODUCTS AND THE GAMMA FUNCTION 454
- 7.2 ASYMPTOTIC EXPANSIONS AND THE METHOD OF STEEPEST DESCENT 474
- SUPPLEMENT: BOUNDED VARIATION AND THE PROOF OF THE STATIONARY PHASE FORMULA 494
- 7.3 STIRLING'S FORMULA AND BESSEL FUNCTIONS 503
- REVIEW EXERCISES FOR CHAPTER 7 512

CHAPTER 8**THE LAPLACE TRANSFORM AND APPLICATIONS 516**

- 8.1 BASIC PROPERTIES OF LAPLACE TRANSFORMS 516
- 8.2 THE COMPLEX INVERSION FORMULA 531
- 8.3 APPLICATION OF LAPLACE TRANSFORMS TO ORDINARY DIFFERENTIAL EQUATIONS 537
- SUPPLEMENT: THE FOURIER TRANSFORM AND THE WAVE EQUATION 539
- REVIEW EXERCISES FOR CHAPTER 8 554

ANSWERS TO ODD-NUMBERED EXERCISES 557

INDEX 593
