

CONTENTS

INTRODUCTION	1
Part 1. NUMBER THEORY	7
Prime Factor Decomposition	9
Euclidean Algorithm	14
Rational Binomial Coefficients	18
Continued Fraction Representation of Real Numbers	24
Exact Continued Fractions for Quadratic Irrationalities	31
Part 2. ITERATION	39
Iteration	41
Iteration with Aitken Acceleration	47
Aitken-Steffensen Iteration	53
Newton Iteration for Complex Roots	59
Part 3. POLYNOMIALS	65
Horner Algorithm	67
	ix

Newton's Method for Polynomials	
Bernoulli's Method for Single Dominant Zero	8
Bernoulli's Method for Complex Conjugate Dominant Zeros	8
Quotient-Difference Algorithm	9
Routh Algorithm	10
Schur-Cohn Algorithm I	10
Schur-Cohn Algorithm II	11
Part 4. POWER SERIES	121
Reciprocal Power Series	123
Power of Power Series	134
Exponentiation of Power Series	144
Part 5. INTEGRATION	153
Numerical Integration with Step Refinement	155
Romberg Algorithm	162
Plana Summation Formula	170
Differential Equation of First Order, Trapezoidal Method	181
Autonomous Differential Equation of Second Order, First Derivative Absent	189
Linear Second Order Differential Equation	196
Part 6. SPECIAL FUNCTIONS	205
Log-Arcsine Algorithm	207

Gamma Function	214
Incomplete Gamma Function	223
Error Function	233
Complete Elliptic Integrals	241
Bessel Functions, Integer Order	247
Bessel Functions, Arbitrary Order	253
Bessel Functions: Asymptotic Series	260
Riemann Zeta Function on Critical Line	268
 INDEX	 277