## **CONTENTS**

Preface

Preface	vii
Contents of Volume I	xv
Introduction	<b>xv</b> ii
IX. Expansions of Generalized Hypergeometric Functions in Series of Functions of the Same Kind	
<ul> <li>9.1. Expansions of <sub>p</sub>F<sub>q</sub>'s in Series of Other <sub>p</sub>F<sub>q</sub>'s</li> <li>9.2. Expansions of G-Functions in Series of G-Functions</li> <li>9.3. Expansions in Series of Jacobi and Chebyshev Polynomials</li> <li>9.4. Expansions in Series of Bessel Functions</li> <li>9.5. Miscellaneous Expansions</li> </ul>	1 14 28 44 62
X. The τ-Method	
<ul> <li>10.1. Differential Equations</li> <li>10.2. The Exponential Function</li> <li>10.3. The Padé Table</li> <li>10.4. Padé Approximations to the Solution of the First Order Riccati Equation</li> <li>10.5. Padé Approximations to the Solution of a Generalized Second Order Riccati Equation</li> </ul>	66 69 75 77 86
XI. Polynomial and Rational Approximations to Generalized Hypergeometric Functions	
11.1. Introduction 11.2. Polynomial and Rational Approximations for the $_pF_q$ 11.3. Analysis of the Error 11.4. Polynomial and Rational Approximations for a Laplace Integral 11.5. Polynomial and Rational Approximations for Whittaker and Bessel Functions 11.6. Polynomial and Rational Approximations for Lommel and Struve Functions 11.7. Polynomial and Rational Approximations for a Certain Class of $G$ -Functions	92 93 98 106 111 116 118

xii CONTENTS

XII. Recursion Formulas for Polynomials and Functions Which Occur in Infinite Series and Rational Approximations to Generalized Hypergeometric Functions	
10.1. Turned and an	133
12.1. Introduction 12.2. Recursion Formulas for the Extended Jacobi and Laguerre Functions	134
12.2. Recursion Formula for the Numerator Polynomial in the Rational Approxima-	13.
tion for the Generalized Hypergeometric Function	148
12.4. Recursion Formula for Coefficients in the Expansion of the G-Function in	
Series of Extended Jacobi Polynomials	153
12.5. Computation by Use of Recurrence Formulas	159
XIII. Polynomial and Rational Approximations for $E(z) = {}_2F_1(1, \sigma; \rho + 1; -1/z)$	
12.1. D. L J. Davis and Amenovimentions	167
13.1. Polynomial and Rational Approximations	169
13.2. Padé Approximations 13.3. Inequalities for $E(z)$ , $z > 0$	173
13.4. Continued Fractions	173
13.5. Approximations for $E(1/z)$	175
13.6. The Incomplete Beta Function	178
13.7. The Binomial Function	179
XIV. Polynomial and Rational Approximations for the Incomplete Gamma Function	
14.1. Introduction	186
14.2. Padé Approximations for the Ascending Series	189
14.3. Inequalities for the Ascending Series	194
14.4. Continued Fractions for the Ascending Series	196
14.5. The Exponential Integral and Related Integrals	196
	196 198
14.5. The Exponential Integral and Related Integrals 14.6. Padé Approximations for $\Gamma(\nu, z)$ 14.7. Inequalities for $\Gamma(\nu, z)$	196 198 201
<ul> <li>14.5. The Exponential Integral and Related Integrals</li> <li>14.6. Padé Approximations for Γ(ν, z)</li> <li>14.7. Inequalities for Γ(ν, z)</li> <li>14.8. Continued Fractions for Γ(ν, z)</li> </ul>	196 198
14.5. The Exponential Integral and Related Integrals 14.6. Padé Approximations for $\Gamma(\nu, z)$ 14.7. Inequalities for $\Gamma(\nu, z)$	196 198 201
<ul> <li>14.5. The Exponential Integral and Related Integrals</li> <li>14.6. Padé Approximations for Γ(ν, z)</li> <li>14.7. Inequalities for Γ(ν, z)</li> <li>14.8. Continued Fractions for Γ(ν, z)</li> <li>14.9. Uniform Asymptotic Representation for the Error in the Padé Approxima-</li> </ul>	196 198 201 202
<ul> <li>14.5. The Exponential Integral and Related Integrals</li> <li>14.6. Padé Approximations for Γ(ν, z)</li> <li>14.7. Inequalities for Γ(ν, z)</li> <li>14.8. Continued Fractions for Γ(ν, z)</li> <li>14.9. Uniform Asymptotic Representation for the Error in the Padé Approximations to Γ(ν, z)</li> </ul>	196 198 201 202
<ul> <li>14.5. The Exponential Integral and Related Integrals</li> <li>14.6. Padé Approximations for Γ(ν, z)</li> <li>14.7. Inequalities for Γ(ν, z)</li> <li>14.8. Continued Fractions for Γ(ν, z)</li> <li>14.9. Uniform Asymptotic Representation for the Error in the Padé Approximations to Γ(ν, z)</li> <li>XV. Trapezoidal Rule Integration Formulas</li> </ul>	196 198 201 202 202
<ul> <li>14.5. The Exponential Integral and Related Integrals</li> <li>14.6. Padé Approximations for Γ(ν, z)</li> <li>14.7. Inequalities for Γ(ν, z)</li> <li>14.8. Continued Fractions for Γ(ν, z)</li> <li>14.9. Uniform Asymptotic Representation for the Error in the Padé Approximations to Γ(ν, z)</li> <li>XV. Trapezoidal Rule Integration Formulas</li> <li>15.1. Introduction</li> </ul>	196 198 201 202 202 214 215 218
<ul> <li>14.5. The Exponential Integral and Related Integrals</li> <li>14.6. Padé Approximations for Γ(ν, z)</li> <li>14.7. Inequalities for Γ(ν, z)</li> <li>14.8. Continued Fractions for Γ(ν, z)</li> <li>14.9. Uniform Asymptotic Representation for the Error in the Padé Approximations to Γ(ν, z)</li> <li>XV. Trapezoidal Rule Integration Formulas</li> <li>15.1. Introduction</li> <li>15.2. Theoretical Development</li> <li>15.3. Example I. Bessel Functions of the First Kind of Order n</li> <li>15.4. Example II. The Complete Elliptic Integrals</li> </ul>	196 198 201 202 202 214 215 218 220
<ul> <li>14.5. The Exponential Integral and Related Integrals</li> <li>14.6. Padé Approximations for Γ(ν, z)</li> <li>14.7. Inequalities for Γ(ν, z)</li> <li>14.8. Continued Fractions for Γ(ν, z)</li> <li>14.9. Uniform Asymptotic Representation for the Error in the Padé Approximations to Γ(ν, z)</li> <li>XV. Trapezoidal Rule Integration Formulas</li> <li>15.1. Introduction</li> <li>15.2. Theoretical Development</li> <li>15.3. Example I. Bessel Functions of the First Kind of Order n</li> </ul>	196 198 201 202 202 214 215 218

CONTENTS xii	i
--------------	---

468

271. Applications	
16.1. Zeros of Functions	227
16.2. Solution of Differential Equations in Series of Chebyshev Polynomials of the	
First Kind	234
16.3. Orthogonal Polynomials, Numerical Integration, and the Inversion of Laplace	
Transforms	243
16.4. Inversion of Laplace Transforms by Use of Rational Approximations	255
16.5. Approximations for Elliptic Integrals	269
16.6. Approximations for the Debye Functions	273
XVII. Tables of Coefficients	
17.1. Introduction	282
17.2. Computation and Check of the Tables	282
17.3. Other Coefficients	285
17.4. Tables of Coefficients	292
DULU	4.5.
Bibliography	453
Notation Index	463

Subject Index to Volumes I and II