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3.3.1. Gauss' Multiplication Formula
3.4. Logarithmic Derivative of the Gamma Function; 3.5. Riemann's Zeta Function; 3.6. Asymptotic Expansions; 3.6.1. Estimations of the Remainder; 3.6.2. Ratio of Two Gamma Functions; 3.6.3. Application of the Saddle Point Method; 3.7. Remarks and Comments for Further Reading; 3.8. Exercises and Further Examples; 4 Differential Equations; 4.1. Separating the Wave Equation; 4.1.1. Separating the Variables; 4.2. Differential Equations in the Complex Plane; 4.2.1. Singular Points; 4.2.2. Transformation of the Point at Infinity
4.2.3. The Solution Near a Regular Point
4.2.4. Power Series Expansions Around a Regular Point; 4.2.5. Power Series Expansions Around a Regular Singular Point; 4.3. Sturm's Comparison Theorem; 4.4. Integrals as Solutions of Differential Equations; 4.5. The Liouville Transformation; 4.6. Remarks and Comments for Further Reading; 4.7. Exercises and Further Examples; 5 Hypergeometric Functions; 5.1. Definitions and Simple Relations; 5.2. Analytic Continuation; 5.2.1. Three Functional Relations; 5.2.2. A Contour Integral Representation; 5.3. The Hypergeometric Differential Equation
5.4. The Singular Points of the Differential Equation
5.5. The Riemann-Papperitz Equation; 5.6. Barnes' Contour Integral for $F(a, b; c; z)$; 5.7. Recurrence Relations; 5.8. Quadratic Transformations; 5.9. Generalized Hypergeometric Functions; 5.9.1. A First Introduction to q -functions; 5.10. Remarks and Comments for Further Reading; 5.11. Exercises and Further Examples; 6 Orthogonal Polynomials; 6.1. General Orthogonal Polynomials; 6.1.1. Zeros of Orthogonal Polynomials; 6.1.2. Gauss Quadrature; 6.2. Classical Orthogonal Polynomials; 6.3. Definitions by the Rodrigues Formula
6.4. Recurrence Relations

Sommario/riassunto

This book gives an introduction to the classical, well-known special functions which play a role in mathematical physics, especially in boundary value problems. Calculus and complex function theory form the basis of the book and numerous formulas are given. Particular attention is given to asymptotic and numerical aspects of special functions, with numerous references to recent literature provided.
