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Compact Operators -- 2.4 Function Spaces -- 2.4.1 Lp-Spaces -- 2.4.2 Spaces of Continuous Functions -- 2.4.3 Approximation Spaces and Unbounded Linear Operators -- 2.5 Fredholm Operators -- 2.6 Stability of Operator Sequences -- 2.7 Fixed Point Theorems and Newton's Method -- 3 Weighted Polynomial Approximation and Quadrature Rules on (-1,1) -- 3.1 Moduli of Smoothness, K-Functionals, and Best Approximation -- 3.1.1 Moduli of Smoothness and K-Functionals -- 3.1.2 Moduli of Smoothness and Best Weighted Approximation -- 3.1.3 Besov-Type Spaces -- 3.2 Polynomial Approximation with Doubling Weights on the Interval (-1,1) -- 3.2.1 Definitions -- 3.2.2 Polynomial Inequalities with Doubling Weights -- 3.2.3 Christoffel Functions with Respect to Doubling Weights -- 3.2.4 Convergence of Fourier Sums in Weighted Lp-Spaces -- 3.2.5 Lagrange Interpolation in Weighted Lp-Spaces -- 3.2.6 Hermite Interpolation -- 3.2.7 Hermite-Fejer Interpolation -- 3.2.8 Lagrange-Hermite Interpolation -- 3.3 Polynomial Approximation with Exponential Weights on the Interval (-1,1) -- 3.3.1 Polynomial Inequalities -- 3.3.2 K-Functionals and Moduli of Smoothness -- 3.3.3 Estimates for the Error of Best Weighted Polynomial Approximation -- 3.3.4 Fourier Sums in Weighted Lp-Spaces -- 3.3.5 Lagrange Interpolation in Weighted Lp-Spaces -- 3.3.6 Gaussian Quadrature Rules -- 4 Weighted Polynomial Approximation and Quadrature Rules on Unbounded Intervals -- 4.1 Polynomial Approximation with Generalized Freud Weights on the Real Line -- 4.1.1 The Case of Freud Weights -- 4.1.2 The Case of Generalized Freud Weights -- 4.1.3 Lagrange Interpolation in Weighted Lp-Spaces.
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Sommario/riassunto

The book presents a combination of two topics: one coming from the theory of approximation of functions and integrals by interpolation and quadrature, respectively, and the other from the numerical analysis of operator equations, in particular, of integral and related equations. The text focusses on interpolation and quadrature processes for functions defined on bounded and unbounded intervals and having certain singularities at the endpoints of the interval, as well as on numerical methods for Fredholm integral equations of first and second kind with smooth and weakly singular kernel functions, linear and nonlinear Cauchy singular integral equations, and hypersingular integral equations. The book includes both classic and very recent results and will appeal to graduate students and researchers who want to learn about the approximation of functions and the numerical solution of operator equations, in particular integral equations.