Numerical Analysis

Polynomial approximation

Interpolation by polynomials. Divided differences of functions and relations to derivatives. Orthogonal polynomials and their recurrence relations. Least square approximation by polynomial. Gaussian quadrature formulae. Peano kernel theorem and applications.

Computationet of ordinary differential equations

Euler's method and proof of convergence. Multi-step methods, including order, the root condition and the concept of convergence. Runge-Kutta schemes. Stiff equations and A-stability

Systems of equation and least square calculations

S-D Conte and C de Boor Elementary Numerical Ana Analysis: an algorithmic approach Mc-Graw-Hill 1990 is a book notable for these content!

LU triangular factorization of matrices. Relation to Gaussian elimination. Column pivoting. Factorizations of symmetric and band matrices. The Newton-Raphson method for system of non-linear algerbric equation. QR factorization of rectangular matrices by Gram-Schmidt, Givens and ~~Holder~~ house-holder techiques. Application to linear least square calculations.

Appropriate books

S.D Conte and C. de Boor Elementary Numerical Analysis: an algorithmic approach McGraw-Hill 1980

G.H Golub and C. Van Loan Matrix Computations Johns Hopkins University Press

A Iserles A First Course in the Numerical Analysis of Differential Equation CUP 2009

E Suli and D.F Meyers An Introduction to numerical analysis CUP 2003

A Ralston and P Rabinowitz A First in Course in numerical course Dover 2001.

M.J.D Powell Approximation Theory and Methods CUP 1981

P.J Davis Interpolation and Approximation Dover 1975