

List of topics for Preliminary Exam on Numerical Analysis, May 2022

The exam is based on Numerical Analysis courses MATH 6370 and MATH 6371 with the textbook Numerical Mathematics by A. Quarteroni, R. Sacco and F. Saleri, Second Edition published by Springer in 2007

1. Foundation of Matrix Analysis (Sections 1.1 -1.12).
2. Direct methods for the Solution of Linear Systems (Sections 3.1-3.5).
3. Iterative methods for Solving Linear Systems (Sections 4.1 - 4.3).
4. Rootfinding for Nonlinear Equations (Sections 6.1 - 6.3).
5. Nonlinear systems and Numerical Optimization (Sections 7.1 - 7.2).
6. Polynomial interpolation (Sections 8.1 - 8.4).
7. Numerical Integration (Sections 9.1 - 9.2).
8. Orthogonal Polynomials in Approximation Theory (Sections 10.1 - 10.4)
9. Numerical Solution of Ordinary Differential Equations (Sections 11.1 - 11.3).
10. Two Point Boundary Value Problem (Sections 12.1, 12.2, 12.4).