Lists of topics for Preliminary Exam on Numerical Analysis

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

1. Foundation of Matrix Analysis (Sections 1.2-1.12)

2. Principles of Numerical Mathematics (Section 2.1-2.4)

3. Direct Methods for the Solution of Linear Systems (Sections 3.1-3.5)

4. Iterative Methods for Solving Linear Systems (Sections 4.1-4.3)

5. Approximation of Eigenvalues and Eigenvectors (Sections 5.1-5.3)

6. Rootfinding for Nonlinear Equations (Sections 6.1-6.3)

7. Polynomial Interpolation (Sections 8.1-8.4)

8. Numerical Integration (Sections 9.1-9.2)

9. Orthogonal Polynomials in Approximation Theory (Sections 10.1-10.4, 10.7-10.8)

10. Numerical Solution of Ordinary Differential Equations (Sections 11.1-11.6)