

Theoretical Questions for the course

Numerical Linear Algebra

TMA265/MMA600

- Perturbation theory.
- Gaussian elimination.
- The need of pivoting.
- Improving the accuracy of a solution.
- Real symmetric positive definite matrices.
- Band matrices.
- Matrix factorizations that solve the linear least squares problem: normal equations, QR decomposition, SVD decomposition.
- Perturbation theory for the least squares problem.
- Orthogonal matrices. Householder transformations.
- Givens rotations.
- Rank-deficient least squares problems.
- Moore- Penrose pseudoinverse A^+ .
- Solving rank-deficient least squares problems using QR with pivoting.
- Nonsymmetric eigenvalues problems. Jordan and Shur Canonical forms.
- Computing eigenvectors from Shur form.
- Algorithms for the nonsymmetric eigenproblems: power method, inverse iteration, QR iteration, Hessenberg reduction, tridiagonal and bidiagonal reduction.
- Regular matrix pencils and Weierstrass canonical form.
- Application of Jordan and Weierstrass forms to Differential equations.