Review for Test 1

You must be familiar with the following topics and be able to solve the problems related to them.

- Elementary row operations, Gauss elimination
- Echelon form
- Existence and uniqueness theorems for solutions of a linear system
- Homogeneous system
- Null space of a matrix, nullity of a matrix
- Determinants
- Properties of a determinants
- Inverse of a matrix
- Gauss-Jordan elimination
- Properties of inverse
- Linear dependence and independence of vectors
- Span of a set of vectors
- Rank of a matrix
- Row space and column space of a matrix
- Vector space
- Basis for a vector space
- Dimension of a vector space
- Inner product
- Norm of a vector
- Orthogonal, orthonormal set of vectors
- Definition of an eigenvalue and eigenvector
- Characteristic equation
- Eigenvalue properties of a symmetric, skew-symmetric, orthogonal matrices
- Properties of the columns of an orthogonal matrix
- Definition of similar matrices
• Eigenvalue properties of similar matrices
• Diagonalization of a matrix
• Solution of the second order ODE \( y'' + ay' + by = 0 \)
• Solution of the Euler-Cauchy equation
• Eigenvalue and eigenfunctions of a Sturm-Liouville problem
• Orthogonality of the eigenfunctions of a Sturm-Liouville problem

Some test problems will be similar to the in-class examples and problems on the schedule sheet.