**Spring Semester, Scientific Computing Final Exam**

1. Given a linear system where and , (a) Compute the 1-norm and infinite norm of A, (b) compute the 1-norm, 2-norm and infinite norm of **b**. (10%)
2. Decompose A into A = L\*U, where L and U are lower and upper triangular matrices. (10%)
3. Eliminate A into an upper triangular matrix by using Gaussian elimination and partial pivoting. Remember to modify **b** too.(10%)
4. (a) What is the condition number of a linear system (b) How to estimate the sensitivity of this linear system by using the condition number? (10%)
5. Assume and w=1.5. Please compute x(1) by using SOR method. (10%)
6. , (a) please compute the eigen system of A by using the power method. (Assume .) (b)Compute the eigen system by using the inverse power method. Assume . Please iterate the computation by at least 3 times. (20%)
7. , compute the eigen-system by using the Jacobi’s method. You just have to perform one similarity transformation. (a) The rotational matrix=? (b) After the transformation, A=? (c) The eigenvalues and eigenvectors=? (Remember to compute the rotational angle by taking advantage of the special case A11=A22.) (20%)
8. , (a) compute the Householder’s matrix based on x, (b) transform the vector x by using the Householder matrix. (10%)