MATH 434/534

Computer Assignment 3
Due on November 15, 2011

Chapter 6
M6.1
(a)
Write MATLAB programs called **linsyswp** and **linsyspp** to solve $Ax = b$ and to compute the growth factor (gf) usign Gaussian elimination with no and partial pivotings, respectively, as follows;

$$(\hat{x}, gf) = lnsyswp(A, b).$$
$$(\hat{x}, gf) = lnsyspp(A, b).$$

(b)
Using the computed solutions and the growth factors obtained in **(a)** make the following table for each of the given data set.

Test Data for Problem M6.1:
Each of the following matrices of order 20: Hilbert, Pei, Hankel, Vandermonde, a randomly generated matrix, and a triangular matrix with small diagonal entries. For the Pei matrix, take α close too 1.

Create the vector b in each case such that the solution vector x is a vector with all components equal to 1. Present your result using the following table.

Method	$\|\hat{x}\|_\infty$	$\frac{\|x-\hat{x}\|_2}{\|x\|_2}$	$\|b - A\hat{x}\|_2$	$Cond_2(A)\frac{\|b-A\hat{x}\|_2}{\|b\|_2}$	Growth Factor
linsyswp					
linsypp					
$A^{-1}b$					

M6.5
Using the MATCOM program **choles** or the MATLAB program **chol**, write a MATLAB program, **linsyschol**, to implement Algorithm 6.8 in the following format:

$$[x] = linsyschol(A, b).$$

Data:
Create a 200×200 lower triangular matrix L with positive diagonal entries taking some of the diagonal entries small enough to be very close to zero, multiply it by L^T, and take $A = LL^T$ as your test matrix A. Create the vector b such that x has all its entries equal to 1.