<In the Name of God>

Numerical Analysis Fall 2012, Dec 20th

Instructor: Dr. Hamed Masnadi-Shirazi

$$\begin{bmatrix} a_{11} & a_{12} & \dots & a_{1k} & \dots & a_{1n} \\ 0 & a_{22} & \dots & a_{2k} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & a_{kk} & \dots & a_{kn} \\ 0 & 0 & \dots & a_{kk+1} & \dots & a_{kn} \\ \vdots & \vdots & \ddots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & a_{nk} & \dots & a_{nn} \end{bmatrix},$$

HW #3

Due Date: Dec 30, 2012 (Late HWs will get a zero grade.)

(Note: getting help or helping others on this HW is NOT allowed!)

1) **Linear System of Equations**: (A)Use the algorithm presented on pg-374 of the textbook to write the Gaussian elimination with partial pivoting algorithm for solving a linear system of equations. The input to your algorithm should be the augmented matrix. Use your algorithm to solve the following problems:
   a) 0.003x1 + 59.14x2=59.17
      5.291x1 – 6.130x2=46.78

   b) x1+x2+3x4=4
      2x1+x2-x3+x4=1
      3x1-x2-x3+2x4=-3
      -x1+2x2+3x3-x4=4

Your program should show the final upper triangle matrix along with the solutions.

(B) Compare your result with Matlabs solutions. By performing x=A\b ;

(C) Create some linear systems with *A* =gallery('orthog',n) for *n=40* by picking a random solution *x* and computing the right-hand side *b* from it, and compare the quality of your solution to the exact solution.

Submission Guide: submit your Matlab program. Submit the output of your program. Failing to follow the above guidelines will result in a ZERO grade!