CS 323E **Homework 8** **Due: Nov. 16, 2004**

1. (8 points)
   Do Problem P5.2.13 (page 187) from the textbook. Output your results from the different implementations in the form of a table (similar to the one at the end of Section 5.2.3). Use the 'tic' and 'toc' functions for timing your implementations. For understanding how the 'tic' and 'toc' functions work, see the program segment at the end of page 51 of the textbook.

2. (a) (5 points)
   Write a MATLAB function `[P, L, U] = MyPLU(A)` which incorporates partial pivoting to compute the LU factorization of the permuted input matrix PA. Write your function as 3 nested loops.

   (b) (6 points)
   Use `MyPLU` to solve $Ax = b$ when A and b are as in (1), (2) and (3). Comment on the accuracy of these solutions.

$$A = \begin{bmatrix} -2 & 4 & -1 & -1 & 3 \\ 4 & -9 & 0 & 5 & 3 \\ -4 & 5 & -5 & 5 & 3 \\ -8 & 8 & -23 & 20 & 3 \\ -1 & 1 & 2 & 3 & 3 \end{bmatrix}, \qquad b = \begin{bmatrix} 12 \\ -32 \\ 3 \\ -13 \\ -8 \end{bmatrix}. \tag{1}$$

$$A = \begin{bmatrix} 10^{-16} & 1 \\ 1 & 1 \end{bmatrix}, \qquad b = \begin{bmatrix} 1 \\ 2 \end{bmatrix}. \tag{2}$$

$$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 1 & 2 \\ 2 & 2 & 6 \end{bmatrix}, \qquad b = \begin{bmatrix} 2 \\ 4 \\ 10 \end{bmatrix}. \tag{3}$$

   (c) (6 points)
   Solve $Ax = b$ without pivoting for the examples in (1), (2) and (3) above. Comment on the accuracy of these solutions.