ASE 211 Homework 4

Due: 12:00 noon, Friday, September 29. Put assignments in the drawer on the third floor of WRW marked 'ASE 211.'

1. By hand, compute the LU decomposition of the following matrix:

$$A = \begin{bmatrix} 3 & -1 & 4 \\ -6 & 4 & -1 \\ 18 & -2 & 39 \end{bmatrix}.$$

2. For the matrix in problem 1, use forward and backward substitution to solve $A\mathbf{x} = \mathbf{b}$, where

$$\mathbf{b} = \begin{bmatrix} 20 \\ -26 \\ 150 \end{bmatrix}.$$

3. Create a matlab m-file called ludecomp.m (as discussed in class), which takes as input a matrix A, and returns the LU decomposition of A. Test your m-file on the matrix in problem 1.

4. Write Matlab m-files forsolve.m and backsolve.m which perform forward and backward substitution, given the LU decomposition of the matrix. Test your m-files on the system given in problems 1 and 2.

5. Use the Matlab code you have written in problems 3 and 4 to solve the system in problem A3.4 in the book. First take $W_3 = 100$, then $W_3 = 50$, 150 and 200. Be sure to output the solution for each value of W_3. Remember you only have to do the LU decomposition once.

Hand in all matlab m-files, diaries and all written work.