1. (10 points)
   Solve a linear system of equations given by

$$
\begin{aligned}
2x_1 + x_2 \quad\quad\ + x_4 &= 4 \\
2x_1 + 2x_2 + 2x_3 + 4x_4 &= 10 \\
4x_1 + 2x_2 - 3x_3 + 3x_4 &= 6 \\
-2x_1 + \quad x_2 + x_3 + 5x_4 &= 5
\end{aligned}
$$

   You should first write the above system in matrix form, $Ax = b$. Then, use Gaussian Elimination to factor the matrix $A = LU$, where L is unit lower triangular and U is upper triangular. Now you have $Ax = b \Rightarrow (LU)x = b$. Use forward substitution to find y such that $Ly = b$, and as the last step use backward substitution to find the final answer x such that $Ux = y$.
   Note 1: Do the above computations using pen/pencil and paper. Show all intermediate steps.
   Note 2: Verify your answer in MATLAB using A \ b.

2. (10 points)
   Write a program in Matlab [x] = lsolve(A,b) to do the above computations. Note that A can be any matrix and b can be any right hand side. However, assume that A is nonsingular and that no "pivoting" is required to solve the linear system. You can use 'if', 'for', 'while' statements and '+', '-', '*' and '/' operations. DO NOT USE any MATLAB functions that directly solve the linear system, such as, LU mldivide, \ , etc.