MATH/COSC 303

Assignment 2 - part B

Due: Feb 11th, assignments are due at the end of lab.

Hand Written Questions:

1. Consider the matrix

$$A = \begin{bmatrix} 1 & 3 & 5 & 1 \\ -2 & -6 & -3 & 1 \\ 2 & 5 & 6 & 2 \\ 3 & 6 & 10 & 1 \end{bmatrix}$$

   a) Find a permutation matrix P such that PA has an LU decomposition.

   b) Find the LU decomposition of PA.

Computer Assisted Questions:

2. Consider the linear system

$$\begin{aligned} x_1 + x_2 + 9x_3 &= 11 \\ -6x_1 + x_2 - x_3 &= -6 \\ x_1 - 5x_2 + x_3 &= -3 \end{aligned}$$

   - Reorder the system to create an equivalent system that is diagonal dominant.
   - Write a MATLAB script to solve the system using the Jacobi Iterative Method starting at $x^0 = (0, 0, 0)$. How many iterations are required to acquire 5 significant digits?
   - Write a MATLAB script to solve the system using the Gauss Seidel Iterative Method starting at $x^0 = (0, 0, 0)$. How many iterations are required to acquire 5 significant digits?