ENGR30003
Numerical Programming for Engineers

Semester 2, 2016

Workshop on Linear Algebraic Systems

Exercise 1

Solve the following system of 4 equations using LU Decomposition

$$\begin{aligned}
x_1 + 2x_2 + 3x_3 + 4x_4 &= 3 \\
3x_1 + 4x_2 + 8x_3 + 9x_4 &= 4 \\
10x_1 + 12x_2 + 4x_3 + 3x_4 &= 8 \\
5x_1 + 6x_2 + 7x_3 + 8x_4 &= 10
\end{aligned}$$

Exercise 2

Use LU Decomposition to find the inverse $[A]^{-1}$ of the matrix

$$[A] = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 8 & 9 \\ 10 & 12 & 4 & 3 \\ 5 & 6 & 7 & 8 \end{bmatrix}$$

Exercise 3

Use the point Jacobi and the Gauss–Seidel iterative methods to solve the following linear system of equations

$$
\begin{aligned}
4x_1 - x_2 \quad -x_3 &= 3 \\
-2x_1 + 6x_2 \quad +x_3 &= 9 \\
-x_1 + x_2 \quad +7x_3 &= -6
\end{aligned}
$$

Which method converges faster ?