MSDM5004 Spring 2024
Homework 2 Part I
Due Mar. 10

1. Find the first two iterations using (1) the Jacobi method and (2) the Gauss-Seidel method for the following linear system, starting from $\mathbf{x}^{(0)} = (0, -1, 0)$.

$$\begin{aligned} 4x_1 + x_2 - x_3 &= 3, \\ -x_1 + 3x_2 + x_3 &= -6, \\ 2x_1 + 2x_2 + 5x_3 &= 4. \end{aligned}$$

2. Write codes using MATLAB (or other programming language) to solve the following linear system using (1) the Gauss-Seidel method and (2) the SOR method with $\omega = 1.2$. The initial estimate is $\mathbf{x}^{(0)} = (0, 0, 0, 1)$. Stop the iterations until the l_∞ norm $\|\mathbf{x}^{(k)} - \mathbf{x}^{(k-1)}\|_\infty \leq 10^{-3}$.

$$\begin{aligned} 4x_1 + x_2 + x_3 - x_4 &= -3, \\ x_1 + 4x_2 - x_3 - x_4 &= -2, \\ x_1 - x_2 + 3x_3 + x_4 &= 2, \\ -x_1 - x_2 + x_3 + 5x_4 &= 5. \end{aligned}$$