

Assignment 4. Jacobi & Gauss-Seidel

Marks 10

Posted on 28.08.2025 @ 2:30 pm and due on 28.08.2025 @ 6:00 pm

1. Solve the following linear equation by Cholesky decomposition (check for symmetric matrix) and Gauss-Seidel to a precision of 10^{-6} . [5]

$$\begin{pmatrix} 4 & -1 & 0 & -1 & 0 & 0 \\ -1 & 4 & -1 & 0 & -1 & 0 \\ 0 & -1 & 4 & 0 & 0 & -1 \\ -1 & 0 & 0 & 4 & -1 & 0 \\ 0 & -1 & 0 & -1 & 4 & -1 \\ 0 & 0 & -1 & 0 & -1 & 4 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \\ 2 \\ 2 \\ 1 \\ 2 \end{pmatrix}$$

2. Solve the following linear equation by LU decomposition (without rearranging) and Jacobi & Gauss-Seidel (with rearranging to make diagonally dominant using code) to a precision of 10^{-6} . [5]

$$\begin{pmatrix} 4 & 0 & 4 & 10 & 1 \\ 0 & 4 & 2 & 0 & 1 \\ 2 & 5 & 1 & 3 & 13 \\ 11 & 3 & 0 & 1 & 2 \\ 3 & 2 & 7 & 1 & 0 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = \begin{pmatrix} 20 \\ 15 \\ 92 \\ 51 \\ 15 \end{pmatrix}$$