

### MTP 290-Problem Set 6

1. Write a MATLAB script for implementing the Gauss-Jacobi method to solve the system  $Ax = b$ , where A is a non-singular matrix.
2. Solve the following linear system by Gauss-Jacobi method, with tolerance =  $10^{-4}$  in the  $l_\infty$  norm. Choose initial guess as  $x_1 = 1/2 = x_2$

$$\begin{aligned}10x_1 + x_2 &= 11 \\ x_1 + 10x_2 &= 11.\end{aligned}$$

3. Solve the following linear system by Gauss Jacobi method and choose initial guess as  $x_1 = x_2 = x_3 = 0$

$$\begin{aligned}4x_1 + x_2 - x_3 &= 3 \\ 2x_1 + 7x_2 + x_3 &= 19 \\ x_1 - 3x_2 + 12x_3 &= 31.\end{aligned}$$

4. Use Gauss-Jacobi Method to solve (Generate any initial guess in your programme)

$$\begin{aligned}5x_1 - 2x_2 + 3x_3 + 6x_5 &= -1 \\ -3x_1 + 9x_2 + x_3 - 2x_4 + 7.4x_5 &= 2 \\ 2x_1 - 1x_2 - 7x_3 + x_4 + 6.7x_5 &= 3 \\ 4x_1 + 3x_2 - 5x_3 + 7x_4 + 9x_5 &= 0.5 \\ 2x_1 + 3.5x_2 + 6.1x_3 - 4x_4 - 8.1x_5 &= 3.1.\end{aligned}$$

5. Use Gauss-Jacobi Iterations to attempt solving the linear system

$$\begin{aligned}x_1 + 2x_2 + 3x_3 &= 5 \\ 2x_1 - x_2 + 2x_3 &= 1 \\ 3x_1 + x_2 - 2x_3 &= -1.\end{aligned}$$

(Whether the method converges?)

6. Write a MATLAB script for implementing the Gauss-Seidel method to solve the system  $Ax = b$ , where A is a non-singular matrix.
7. Redo the problem 5 and 6 using Gauss-Seidel method, with tolerance =  $10^{-4}$  in the  $l_\infty$  norm.
8. Use Gauss-Seidel Iterations to attempt solving the linear system

$$\begin{aligned}2x_1 + 8x_2 + 3x_3 + x_4 &= -2 \\ 2x_2 - x_3 + 4x_4 &= 4 \\ 7x_1 - 2x_2 + x_3 + 2x_4 &= 3 \\ -x_1 + 5x_3 + 2x_2 &= 5.\end{aligned}$$

(Whether the method converges?)