

MA 8019: Numerical Analysis I – Homework #5

Name:

Student ID number:

Consider the linear system $Ax = b$, where

$$A = \begin{bmatrix} 2 & -1 & & & & & & & & \\ -1 & 2 & -1 & & & & & & & \\ & -1 & 2 & -1 & & & & & & \\ & & & \ddots & \ddots & \ddots & & & & \\ & & & & -1 & 2 & -1 & & & \\ & & & & & -1 & 2 & & & \end{bmatrix}_{10 \times 10}, \quad b = \begin{bmatrix} 1 \\ 0 \\ 0 \\ \vdots \\ 0 \\ 1 \end{bmatrix}_{10 \times 1}$$

Using $x^{(0)} = (1, 0, 0, \dots, 0)^\top$ as an initial vector, write Matlab files for the Jacobi, Gauss-Seidel, SOR with $\omega = 1.25$ to solve the system.