Write a Matlab function for the SOR method. Use your Matlab function to solve the following problem.

Solve the linear system $A\mathbf{x} = \mathbf{b}$ to within 10^{-5} in the l_∞ norm, using the Jacobi method and the SOR method with $\omega = 1$, 1.1 and 1.2. The entries of A are given by

$$a_{i,j} = \begin{cases} 1, & \text{when } i = j \text{ and } i = 1, 2, \cdots, n, \\ -1/2, & \text{when } j = i + 1 \text{ and } i = 1, 2, \cdots, n-1, \\ -1/2, & \text{when } j = i - 1 \text{ and } i = 2, \cdots, n, \\ 0, & \text{otherwise,} \end{cases}$$

and the entries of $\mathbf{b}$ are

$$b_1 = 1/2, \quad b_i = 0, \text{ for } i = 2, \cdots, n.$$

Solve this system using $n = 50$, 100.