1. Jacobi Method

Solve the differential equation

$$u'' = f, \qquad u(0) = 1, \qquad u(1) = 3$$

with u and f given by (4.82) and (4.83) in the book.

1. Implement the standard second order finite difference method for this problem and plot the solution for $m = 25, 50, 100$ grid points.
2. Implement the Jacobi method and plot the solutions for all above m for each $2,000$th iteration of $20,000$ total iterations.
3. For all above m, plot the errors in the $\|\cdot\|_2$-norm for every 100th iteration.