HW 7

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1 Comparing various methods

Check the other pdf
Based on these calculations, the Gauss-Seidel method and the SOR-method appear to converge faster than the Jacobi method for this

2 More practice on various methods

Check the other pdf

Both the Jacobi and Gauss-Seidel methods are iterative methods used to solve a system of linear equations. However, they don't always converge to the true solution. The convergence of these methods typically depends on the properties of the matrix (like diagonal dominance or positive definiteness) and initial guesses.The Jacobi method uses the previous iteration's values to calculate the current iteration's values, while Gauss-Seidel uses the most current values, which could include values calculated within the current iteration.If the spectral radius of the iteration matrix is less than 1, the methods will converge. Alternatively, a practical criterion for convergence is that the matrix is diagonally dominant, either strictly or non-strictly. The system you provided does not appear to meet these conditions, hence the uncertainty in the convergence of the methods.To provide a definitive answer about convergence, one would need to calculate the spectral radius of the iteration matrix.

3 SOR in Matlab

3.1 a

Check the sor1.m file

3.2   b
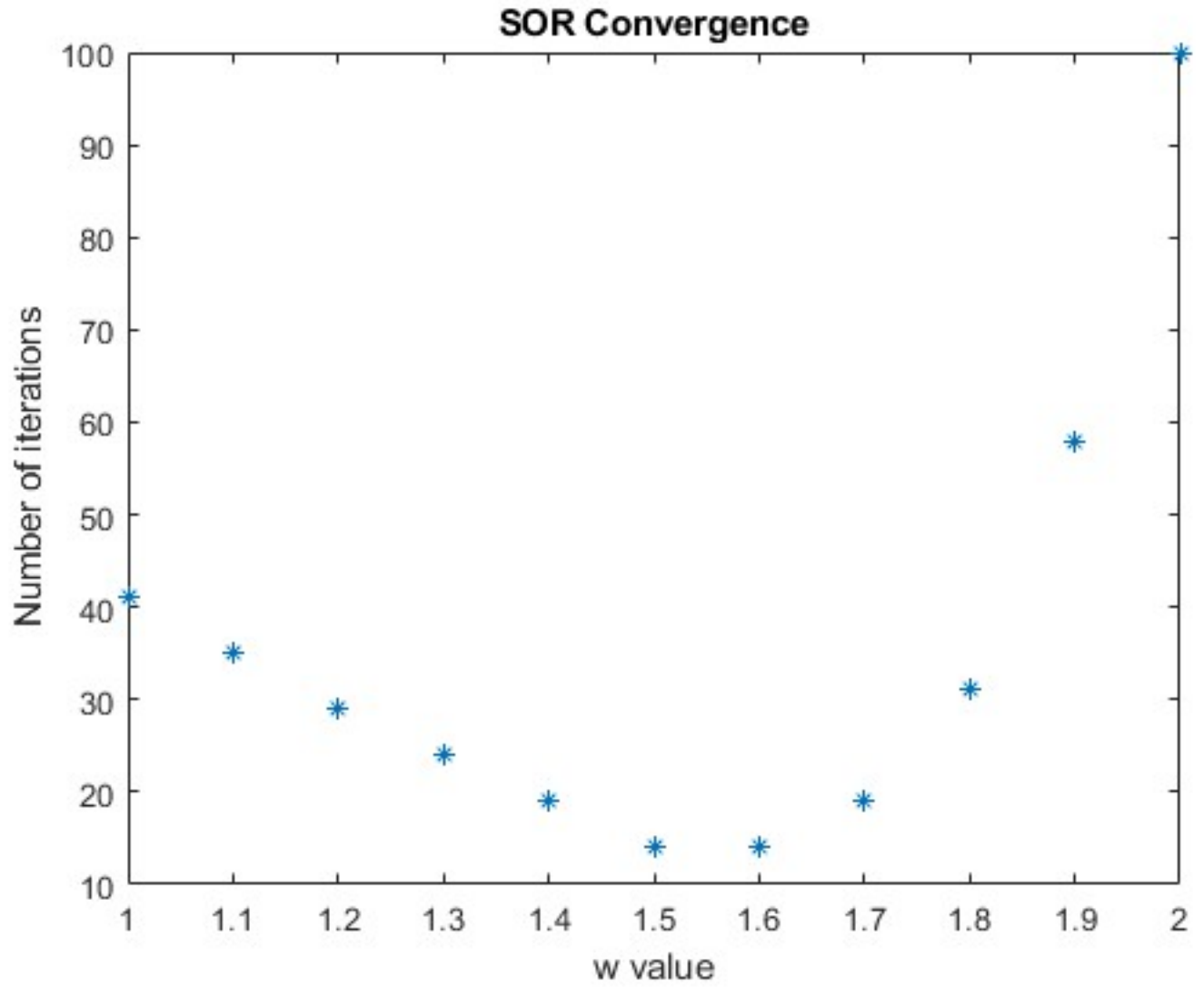
SOR Convergence

$w = 1.5$

x =

0.9094
0.8338
0.7698
0.7148
0.6671
0.6254
0.5885
0.5558
0.5264

nit =14

4   Jacobi iterations in Matlab

Check out jacobi1.m file
Result
   x =

0.9098
0.8346
0.7709
0.7162
0.6686
0.6268
0.5897
0.5566
0.5269

nit =70

    We can see that SOR converges faster than Jacobi but, the fastest convergence doesn't always mean the best method

5   SOR with Jacobi iterations

check the other pdf.