
MATH 441/541

Applied Mathematics II

Homework assignment 1

Date assigned: April 13, 2009

Due date: **April 20, 2009**

- Include a cover page and *this* problem sheet
- Include the printout of your program(s) (if any) for completeness

PROBLEMS:

Consider the following system:

$$\begin{aligned} 3u_1 + 2u_2 + u_3 &= 7, \\ 2u_2 + u_3 &= 4, \\ -u_1 + u_2 + 4u_3 &= 1. \end{aligned} \tag{1}$$

1. Solve (1) using Gauss-Seidel method. Take stopping tolerance $\varepsilon = 10^{-6}$ and initial guess $\vec{u}^0 = [111]^T$.
2. Compute Jacobi iteration matrix R_J and obtain optimal value of ω_b for SOR method
3. Solve (1) using SOR method. Take stopping tolerance $\varepsilon = 10^{-6}$ and initial guess $\vec{u}^0 = [111]^T$. Use optimal value of ω_b you obtained and some "non-optimal" value for ω .
4. For each case (GS, SOR with ω_b , SOR with any ω) indicate number of iterations required to obtain accuracy within given tolerance.