

**Numerical Methods for Engineering – Graduate Course 019003****Prep HW 2: Iterative techniques for solving linear systems****Due date: before next lecture**

1. What are advantages of using iterative techniques for solving linear systems compared to direct methods?
2. Perform 3 iterations using Jacobi method on the next system:

$$\begin{cases} 17x_1 - 2x_2 - 3x_3 = 500 \\ -5x_1 + 21x_2 - 2x_3 = 200. \\ -5x_1 - 5x_2 + 22x_3 = 30 \end{cases}$$

What is the condition to guarantee convergence?

3. Perform 3 iterations using Gauss- Zeidel method on the next system:

$$\begin{cases} -5x_1 + 12x_3 = 80 \\ 4x_1 - x_2 - x_3 = -2 \\ 6x_1 + 8x_2 = 45 \end{cases}$$

What are the differences between the Jacobi and Gauss-Zeidel methods? Advantages, disadvantages. Is the convergence condition identical in both cases?

4. Explain the SOR method in short. When is it advised to use it? Will it always be better than the above methods?