Problem Sheet 8a

CH2013: Computational Programming and Simulations Lab
July-Nov 2023
Problem Sheet #8a

04 October 2023

1) Use the Gauss-Seidel method (a) without relaxation and (b) with relaxation ($\lambda = 0.95$) to solve the following system to a tolerance of $\varepsilon_s = 5\%$. If necessary, rearrange the equations to achieve convergence.

$$-3x_1 + x_2 + 15x_3 = 44$$
$$6x_1 - 2x_2 + x_3 = 5$$
$$5x_1 + 10x_2 + x_3 = 28$$

Comment on the result you have obtained. How do you think the system of equations converge, for relaxation factor >1 and <1.

2) Use the Gauss-Seidel method (a) without relaxation and (b) with relaxation ($\lambda = 1.2$) to solve the following system to a tolerance of $\varepsilon_s = 5\%$. If necessary, rearrange the equations to achieve convergence.

$$2x_1 - 6x_2 - x_3 = -38$$
$$-3x_1 - x_2 + 7x_3 = -34$$
$$-8x_1 + x_2 - 2x_3 = -20$$

Comment on the result you have obtained. How do you think the system of equations converge, for relaxation factor >1 and <1.