Sheet 2

1. Use Jacobi Iterative method to find the solution of

$2x_1 + 10x_2 + 3x_3 = 15$

$10x_1 + x_2 + 2x_3 = 13$

$5x_1 - 3x_2 + 10x_3 = 12$ $\qquad$ $Until\ \dfrac{\|x^{(k)} - x^{(k-1)}\|_\infty}{\|x^k\|_\infty} \le 10^{-3}.$

2. Use Jacobi Iterative method to find the solution of

$6x_1 - 2x_2 + x_3 = 11$

$x_1 + 2x_2 - 5x_3 = -1$

$-2x_1 + 7x_2 + 2x_3 = 5$

3. Use Jacobi Iterative method to find the solution of

$5x_1 - 2x_2 + 3x_3 = -1$

$-3x_1 + 9x_2 + x_3 = 2$

$2x_1 - x_2 - 7x_3 = 3$

4. Use Gauss–Seidel Iterative method to find how many iterations are needed to get the solution of the following system of eqs:

$6x_1 - 2x_2 + x_3 = 11$

$x_1 + 2x_2 - 5x_3 = -1$

$-2x_1 + 7x_2 + 2x_3 = 5,\quad with\ \dfrac{\|x^{(k)} - x^{(k-1)}\|_\infty}{\|x^k\|_\infty} \le 10^{-3}.$

5. Use Gauss–Seidel Iterative method to find the solution of:

$5x_1 - 2x_2 + 3x_3 = -1$

$-3x_1 + 9x_2 + x_3 = 2$

$2x_1 - x_2 - 7x_3 = 3.$

6. Use Gauss-Seidel Iterative method to find the solution

$20x + y - 2z = 17$

$2x - 3y + 20z = 25$

$3x + 20y - z = -18$

7. Use Gauss-Seidel Iterative method to find the solution

$5x_1 - 2x_2 + 3x_3 = -1$

$-3x_1 + 9x_2 + x_3 = 2$

$2x_1 - x_2 - 7x_3 = 3.$

8. Use Gauss-Seidel Iterative method to find the solution

$20x + y - 2z = 17$

$2x - 3y + 20z = 25$

$3x + 20y - z = -18$

9. Use Gauss-Seidel Iterative method to find the solution

$10x - y + z = 11.19$

$-x + y + 10z = 35.61$

$x + 10y + z = 28.08$

10. Use SOR Iterative method to find the solution of:

$$5x + y = 10,$$

$$2x + 3y = 4.$$

11.   Use SOR Iterative method to find the solution of:

$$10x + 2y - z = 7$$
$$x + 8y + 3z = -4$$
$$-2x - y + 10z = 9$$

Using $\omega = 1.25$.

13.   Use SOR Iterative method to find the solution of:

$$10x + 2y - z = 7$$
$$x + 8y + 3z = -4$$
$$-2x - y + 10z = 9$$

12.   Use SOR Iterative method to find the solution of:

$$3x - y + z = -1,$$
$$-x + 3y - z = 7,$$
$$x - y + 3z = -7$$

14.   Use SOR Iterative method to find the solution of:

$$4x + 3y = 24,$$
$$-y + 4z = -24,$$
$$3x + 4y - z = 30.$$

15.   Use SOR Iterative method to find the solution of:

$$-2x - y + 10z = 9$$
$$x + 8y + 3z = -4,$$
$$10x + 2y - z = 7, \text{ Until } \frac{\|x^{(k)} - x^{(k-1)}\|_\infty}{\|x^k\|_\infty} \leq 10^{-3}.$$

With My Best Wishes

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