SC374-Computational and Numerical methods

Lab-3 August 22, 2016

Please show all your work. Answers without supporting comments will not be given credit.

1. Perform four iterations of the Newton's method to solve the following system of equation

$$x^2 + xy + y^2 = 7$$
$$x^3 + y^3 = 9$$

Take the initial values $x_0 = 1.5, y_0 = 0.5$.
Exact solution is $x = 2, y = 1$.

2. Solve the following system of equations by using Jacobi iteration method

$$4x_1 + x_2 + x_4 = 1$$
$$x_1 + 4x_2 + x_3 = -2$$
$$x_2 + 4x_3 + x_4 = 2$$
$$x_1 + x_3 + 4x_4 = -2$$

Initialization $X_0 = (0, 0, 0, 0)^T$. Perform four iterations.

3. Solve the following system of linear equations using Gaussian Elimination method

$$10x_1 - x_2 + 2x_3 = 4$$
$$x_1 + 10x_2 - x_3 = 3$$
$$2x_1 + 3x_2 + 20x_3 = 7$$

Solutions : $x_1 = 0.375, x_2 = 0.289, x_3 = 0.269$.