Device Simulation Laboratory

(EE5195)

Problem Sheet-II

Q1: using matrix inversion method solve the following equations and verify answer using slash method.

(a) $2x+y+z=2$, $-x+y-z=3$, $x+2y+3z=-10$

(b) $3x+4y-2z+2w=2$; $4x+9y-3z+5w=8$; $-2x-3y+7z+6w=10$; $x+4y+6z+7w=2$

Q2: Consider the function $f(x)=x^4-x-10$. Find out the roots of the function $f(x)=0$ using the methods mentioned below:

a) Plot the function and see where the value is becoming zero.

b) Bisection method (You can take a=1 and b=3. Can you obtain some other solution by choosing different values of a & b?). Plot the rate of convergence (that is value of c=0.5*(a+b) vs the iteration no.)

c) Fixed point iteration method (Take $g(x)$ as $(x+10)^{0.25}$ and initial guess of 2. Do you see convergence to one solution? Take $g(x)$ as $10/(x^3-1)$ and initial guess of 2. Do you see convergence? Take $g(x)$ as $(x+10)^{0.5}/x$ and initial guess of 2. Do you see convergence? Plot the rate of convergence for the cases where the solution is converging. Comment on the nature of convergence by finding out $g'(x)$ at the initial guess value of x=2)

d) Newton's method (Take initial guess of 2 and see what solution you get. Can you obtain some other solution by choosing a different initial guess? Also plot the rate of convergence.)

e) Secant method

Q4: Use the Newton's method to solve a system of non-linear equations given below

$x_1 + 2x_2 = 2$

$x_1^2 + 4x_2^2 = 4$