Expt.No.8

Title: Numerical solution of system of linear equations, test for consistency and graphical representation.

In this experiment we deal with homogeneous & non homogeneous equations

Consistency of system of linear equations

System of linear equations (homogeneous or non-homogeneous) may have solution or not is known as consistency of the system. In particular system is consistent if it has a solution otherwise not.

For Homogeneous system:

ϱ(coefficient matrix) = r = n ---- trivial solution

ϱ(coefficient matrix) =r < n ---- infinite solution

For Non Homogeneous system:

ϱ(Augmented matrix) $\neq\varrho$(coefficient matrix) ----- No solution

ϱ(coefficient matrix)= ϱ(Augmented matrix) =r =n ---- unique solution

ϱ(coefficient matrix)= ϱ(Augmented matrix) =r < n ---- infinite solution

Program: 1

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%%MATLAB 02: NAME: ROLL NO:
% Matlab Program to test the consistency of System of
% Homogenous linear equations
```

```
clear
clc
A = [1 2 -1; 2 1 4; 3 6 -4];
B = [1; 2; 4];
[m,n] = size(A);
Au = [A,B];
rA = rank(A);
rAu = rank(Au);
if B == zeros(n)
    if rAu == n
        disp('The system is homogeneous and has Trivial solution');
    else
        disp('The system is homogeneous and has Infinitely Many solutions');
    end
```

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else
    disp('The system is Inhomogeneous and');
    if rA == rAu
        if rA == n
            disp('has Unique solution');
            x = linsolve(A,B)
        else
            disp('has Infinitely Many solutions')
        end
    else
        disp('has No solutions(inconsistent)');
    end
end
%Graphical representation of the solution
[x,y] = meshgrid(-10:1:10);
z1 = -1 +x +2*y;
z2 = (2 - 2*x - y)/.4;
z3 = (-4 + 3*x + 6*y)/.4;
figure
surf(x,y,z1)
hold on
surf(x,y,z2)
surf(x,y,z3)
hold off
grid on
```

OUTPUT:

The system is inhomogeneous

x=4 ; y=-2 ; z=-1