**MODERN COLLEGE OF ARTS,SCI. & COMM. PUNE-05.**

**DEPARTMENT OF STATISTICS.(Autonomous)**

**M.Sc.( I )- ST-15**

**EXPT.NO. 3 Date:**

**Title : Solution of system of linear equation using Gauss elimination , Gauss Jordan , Gauss Seidal and Gauss Jacobbi methods**

1. x-3y+z = -1 2. 2x-5y+7z =6

2x+y-4z = -1 x-3y+4z =3

6x-7y+ 8z = 7 3x-8y+11z = 11

3. x+y+z = 7 4. x+ y+z = 2

x+2y+3z =16 x+3y+4z = 22 x+2y+3z = 5 x+3y+6z = 11

x+ 4y+10z =21

5.3x+4y-6z+w =7 6. 4x+3y-7z+w = 7

x-2y+3z-2w = -1 2x+5y-7z-3w = 3

x-3y+4z-w = -2 8x+-3y+5z-2w = 0

5x-y+z-2w = 4 6x+3y+9z-4w = 8

7. x-3y-8z = -10 8. x+y+z = 3

3x+y-4z = 0 3x-5y+2z = 8

2x+5y+6z = 13 5x-3y+4z = 14

9. 2x-3y+z = 0 10. x+2y+3z = 0

x+2y-3z =0 2x+3y+4z = 0

4x-y-2z = 0 7x+13y+9z = 0

11. x-y+2z-3w = 0 12. x+3y+4z+7w = 0

3x+2y-4z+w = 0 2x+4y+5z+8w = 0

5x-3y+2z+6w = 0 3x+y+2z+3w = 0

**Q1).1. x-3y+z = -1**

**2x+y-4z = -1**

**6x-7y+ 8z = 7**

>> A=[1 -3 1;2 1 -4;6 -7 8]

A =

1 -3 1

2 1 -4

6 -7 8

>> b=[-1 -1 7]

b =

-1 -1 7

>> augA=[1 -3 1 -1;2 1 -4 -1;6 -7 8 7]

augA =

1 -3 1 -1

2 1 -4 -1

6 -7 8 7

>> rank(A)

ans = 3

>> rank(augA)

ans = 3

>> %%% system has unique solution

>> augA(2,:)=augA(2,:)-2\*augA(1,:)

augA =

1 -3 1 -1

0 7 -6 1

6 -7 8 7

>> augA(3,:)=augA(3,:)-6\*augA(1,:)

augA =

1 -3 1 -1

0 7 -6 1

0 11 2 13

>> augA(3,:)=7\*augA(3,:)-11\*augA(2,:)

augA =

1 -3 1 -1

0 7 -6 1

0 0 80 80

>> augA(3,:)=augA(3,:)/80

augA =

1 -3 1 -1

0 7 -6 1

0 0 1 1

>> augA(2,:)=augA(2,:)/7

augA =

1.00000 -3.00000 1.00000 -1.00000

0.00000 1.00000 -0.85714 0.14286

0.00000 0.00000 1.00000 1.00000

>> z=1

z = 1

>> y=0.14286+0.85714

y = 1

>> x=-1-1+3

x = 1

>> rref(augA)

ans =

1.00000 0.00000 0.00000 1.00000

0.00000 1.00000 0.00000 1.00000

0.00000 0.00000 1.00000 1.00000

>> x=1

x = 1

>> y=1

y = 1

>> z=1

z = 1

**Q2) 2. . 2x-5y+7z =6**

**x-3y+4z =3**

**3x-8y+11z = 11**

>> A=[2 -5 7;1 -3 4;3 -8 11]

A =

2 -5 7

1 -3 4

3 -8 11

>> b=[6 3 11]

b =

6 3 11

>> augA=[2 -5 7 6;1 -3 4 3;3 -8 11 11]

augA =

2 -5 7 6

1 -3 4 3

3 -8 11 11

>> rank(A)

ans = 2

>> rank(augA)

ans = 3

>> %% rank(A) is not eqaual to rank(augA)

>> %% system has no solution

**3. x+y+z = 7**

**x+2y+3z =16**

**x+2y+3z = 5**

>> A=[1 1 1;1 2 3;1 2 3]

A =

1 1 1

1 2 3

1 2 3

>> b=[7 16 5]

b =

7 16 5

>> augA=[1 1 1 7;1 2 3 16;1 2 3 5]

augA =

1 1 1 7

1 2 3 16

1 2 3 5

>> rank(A)

ans = 2

>> rank(augA)

ans = 3

>> %% rank(A) is not eqaual to rank(augA)

>> %% system has no solution

**4) x+ y+z = 2**

**x+3y+4z = 22**

**x+3y+6z = 11**

**x+ 4y+10z =21**

>> A=[1 1 1;1 3 4;1 3 6;1 4 10]

A =

1 1 1

1 3 4

1 3 6

1 4 10

>> b=[2 22 11 21]

b =

2 22 11 21

>> augA=[1 1 1 2;1 3 4 22;1 3 6 11;1 4 10 21]

augA =

1 1 1 2

1 3 4 22

1 3 6 11

1 4 10 21

>> rank(A)

ans = 3

>> rank(augA)

ans = 4

>> %% rank(A) is not eqaual to rank(augA)

>> %% system has no solution

**5) 3x+4y-6z+w =7**

**x-2y+3z-2w = -1**

**x-3y+4z-w = -2**

**5x-y+z-2w = 4**

>> A=[3 4 -6 1;1 -2 3 -2;1 -3 4 -1;5 -1 1 -2]

A =

3 4 -6 1

1 -2 3 -2

1 -3 4 -1

5 -1 1 -2

>> b=[7 -1 -2 4]

b =

7 -1 -2 4

>> augA=[3 4 -6 1 7;1 -2 3 -2 -1;1 -3 4 -1 -2;5 -1 1 -2 4]

augA =

3 4 -6 1 7

1 -2 3 -2 -1

1 -3 4 -1 -2

5 -1 1 -2 4

>> rank(A)

ans = 3

>> rank(augA)

ans = 3

>> augA(3,:)=augA(3,:)-augA(2,:)

augA =

3 4 -6 1 7

1 -2 3 -2 -1

0 -1 1 1 -1

5 -1 1 -2 4

>> augA(4,:)=augA(4,:)-5\*augA(2,:)

augA =

3 4 -6 1 7

1 -2 3 -2 -1

0 -1 1 1 -1

0 9 -14 8 9

>> augA(2,:)=3\*augA(2,:)-augA(1,:)

augA =

3 4 -6 1 7

0 -10 15 -7 -10

0 -1 1 1 -1

0 9 -14 8 9

>> augA(1,:)=augA(1,:)/3

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -10.00000 15.00000 -7.00000 -10.00000

0.00000 -1.00000 1.00000 1.00000 -1.00000

0.00000 9.00000 -14.00000 8.00000 9.00000

>> augA(3,:)=10\*augA(3,:)-augA(2,:)

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -10.00000 15.00000 -7.00000 -10.00000

0.00000 0.00000 -5.00000 17.00000 0.00000

0.00000 9.00000 -14.00000 8.00000 9.00000

>> augA(4,:)=augA(4,:)+9\*augA(3,:)

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -10.00000 15.00000 -7.00000 -10.00000

0.00000 0.00000 -5.00000 17.00000 0.00000

0.00000 9.00000 -59.00000 161.00000 9.00000

>> augA(4,:)=10\*augA(4,:)+9\*augA(2,:)

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -10.00000 15.00000 -7.00000 -10.00000

0.00000 0.00000 -5.00000 17.00000 0.00000

0.00000 0.00000 -455.00000 1547.00000 0.00000

>> augA(4,:)=augA(4,:)-91\*augA(3,:)

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -10.00000 15.00000 -7.00000 -10.00000

0.00000 0.00000 -5.00000 17.00000 0.00000

0.00000 0.00000 0.00000 0.00000 0.00000

>> augA(3,:)=augA(3,:)/5

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -10.00000 15.00000 -7.00000 -10.00000

0.00000 0.00000 -1.00000 3.40000 0.00000

0.00000 0.00000 0.00000 0.00000 0.00000

>> augA(2,:)=augA(2,:)/10

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -1.00000 1.50000 -0.70000 -1.00000

0.00000 0.00000 -1.00000 3.40000 0.00000

0.00000 0.00000 0.00000 0.00000 0.00000

>> augA(3,:)=-1\*augA(3,:)

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

0.00000 -1.00000 1.50000 -0.70000 -1.00000

-0.00000 -0.00000 1.00000 -3.40000 -0.00000

0.00000 0.00000 0.00000 0.00000 0.00000

>> augA(2,:)=-1\*augA(2,:)

augA =

1.00000 1.33333 -2.00000 0.33333 2.33333

-0.00000 1.00000 -1.50000 0.70000 1.00000

-0.00000 -0.00000 1.00000 -3.40000 -0.00000

0.00000 0.00000 0.00000 0.00000 0.00000

>> rref(augA)

ans =

1.00000 0.00000 0.00000 -0.60000 1.00000

-0.00000 1.00000 0.00000 -4.40000 1.00000

-0.00000 -0.00000 1.00000 -3.40000 -0.00000

0.00000 0.00000 0.00000 0.00000 0.00000

**6) . 4x+3y-7z+w = 7**

**2x+5y-7z-3w = 3**

**8x+-3y+5z-2w = 0**

**6x+3y+9z-4w = 8**

>> A=[4 3 -7 1;2 5 -7 -3;8 -3 5 -2;6 3 9 -4]

A =

4 3 -7 1

2 5 -7 -3

8 -3 5 -2

6 3 9 -4

>> b=[7 3 0 8]

b =

7 3 0 8

>> augA=[4 3 -7 1 7;2 5 -7 -3 3;8 -3 5 -2 0;6 3 9 -4 8]

augA =

4 3 -7 1 7

2 5 -7 -3 3

8 -3 5 -2 0

6 3 9 -4 8

>> rank(A)

ans = 4

>> rank(augA)

ans = 4

>> augA(3,:)=augA(3,:)-4\*augA(2,:)

augA =

4 3 -7 1 7

2 5 -7 -3 3

0 -23 33 10 -12

6 3 9 -4 8

>> augA(4,:)=augA(4,:)-2\*augA(2,:)

augA =

4 3 -7 1 7

2 5 -7 -3 3

0 -23 33 10 -12

2 -7 23 2 2

>> augA(2,:)=2\*augA(2,:)-augA(1,:)

augA =

4 3 -7 1 7

0 7 -7 -7 -1

0 -23 33 10 -12

2 -7 23 2 2

>> augA(4,:)=2\*augA(4,:)-augA(1,:)

augA =

4 3 -7 1 7

0 7 -7 -7 -1

0 -23 33 10 -12

0 -17 53 3 -3

>> augA(1,:)=augA(1,:)/4

augA =

1.00000 0.75000 -1.75000 0.25000 1.75000

0.00000 7.00000 -7.00000 -7.00000 -1.00000

0.00000 -23.00000 33.00000 10.00000 -12.00000

0.00000 -17.00000 53.00000 3.00000 -3.00000

>> augA(3,:)=7\*augA(3,:)+23\*augA(2,:)

augA =

1.00000 0.75000 -1.75000 0.25000 1.75000

0.00000 7.00000 -7.00000 -7.00000 -1.00000

0.00000 0.00000 70.00000 -91.00000 -107.00000

0.00000 -17.00000 53.00000 3.00000 -3.00000

>> augA(4,:)=7\*augA(4,:)+17\*augA(2,:)

augA =

1.00000 0.75000 -1.75000 0.25000 1.75000

0.00000 7.00000 -7.00000 -7.00000 -1.00000

0.00000 0.00000 70.00000 -91.00000 -107.00000

0.00000 0.00000 252.00000 -98.00000 -38.00000

>> augA(2,:)=augA(2,:)/7

augA =

1.00000 0.75000 -1.75000 0.25000 1.75000

0.00000 1.00000 -1.00000 -1.00000 -0.14286

0.00000 0.00000 70.00000 -91.00000 -107.00000

0.00000 0.00000 252.00000 -98.00000 -38.00000

>> augA(4,:)=70\*augA(4,:)-252\*augA(3,:)

augA =

1.00000 0.75000 -1.75000 0.25000 1.75000

0.00000 1.00000 -1.00000 -1.00000 -0.14286

0.00000 0.00000 70.00000 -91.00000 -107.00000

0.00000 0.00000 0.00000 16072.00000 24304.00000

>> augA(3,:)=augA(3,:)/70

augA =

1.00000 0.75000 -1.75000 0.25000 1.75000

0.00000 1.00000 -1.00000 -1.00000 -0.14286

0.00000 0.00000 1.00000 -1.30000 -1.52857

0.00000 0.00000 0.00000 16072.00000 24304.00000

>> augA(4,:)=augA(4,:)/16072

augA =

1.00000 0.75000 -1.75000 0.25000 1.75000

0.00000 1.00000 -1.00000 -1.00000 -0.14286

0.00000 0.00000 1.00000 -1.30000 -1.52857

0.00000 0.00000 0.00000 1.00000 1.51220

>> x4=1.51220

x4 = 1.5122

>> x3=-1.52857+1.3\*x4

x3 = 0.43729

>> x2=-0.14286+x3+x4

x2 = 1.8066

>> x1=1.75-0.25\*x4+1.75\*x3-0.75\*x2

x1 = 0.78224

**7) x-3y-8z = -10**

**3x+y-4z = 0**

**2x+5y+6z = 13**

>> A=[1 -3 -8;3 1 -4;2 5 6]

A =

1 -3 -8

3 1 -4

2 5 6

>> b=[-10 0 13]

b =

-10 0 13

>> augA=[1 -3 -8 -10;3 1 -4 0;2 5 6 13]

augA =

1 -3 -8 -10

3 1 -4 0

2 5 6 13

>> rank(A)

ans = 2

>> rank(augA)

ans = 2

>> augA(3,:)=augA(3,:)-2\*augA(1,:)

augA =

1 -3 -8 -10

3 1 -4 0

0 11 22 33

>> augA(2,:)=augA(2,:)-3\*augA(1,:)

augA =

1 -3 -8 -10

0 10 20 30

0 11 22 33

>> augA(3,:)=10\*augA(3,:)-11\*augA(2,:))

parse error:

syntax error

>>> augA(3,:)=10\*augA(3,:)-11\*augA(2,:))

^

>> augA(2,:)=augA(2,:)/10

augA =

1 -3 -8 -10

0 1 2 3

0 11 22 33

**Q8) . x+y+z = 3**

**3x-5y+2z = 8**

**5x-3y+4z = 14**

>> A=[1 1 1; 3 -5 2;5 -3 4]

A =

1 1 1

3 -5 2

5 -3 4

>> b=[3 8 14]

b =

3 8 14

>> augA=[1 1 1 3; 3 -5 2 8;5 -3 4 14]

augA =

1 1 1 3

3 -5 2 8

5 -3 4 14

>> rank(A)

ans = 2

>> rank(augA)

ans = 2

>> augA(3,:)=augA(3,:)-5\*augA(1,:)

augA =

1 1 1 3

3 -5 2 8

0 -8 -1 -1

>> augA(2,:)=augA(2,:)-3\*augA(1,:)

augA =

1 1 1 3

0 -8 -1 -1

0 -8 -1 -1

>> augA(3,:)=augA(3,:)-2\*augA(2,:)

augA =

1 1 1 3

0 -8 -1 -1

0 8 1 1

>> augA(2,:)=augA(2,:)/-8

augA =

1.00000 1.00000 1.00000 3.00000

-0.00000 1.00000 0.12500 0.12500

0.00000 8.00000 1.00000 1.00000

>> rref(augA)

ans =

1.00000 0.00000 0.87500 2.87500

-0.00000 1.00000 0.12500 0.12500

0.00000 0.00000 0.00000 0.00000

**Q9) . 2x-3y+z = 0**

**x+2y-3z =0**

**4x-y-2z = 0**

>> A=[2 -3 1;1 2 -3;4 -1 -2]

A =

2 -3 1

1 2 -3

4 -1 -2

>> b=[0 0 0]

b =

0 0 0

>> augA=[2 -3 1 0;1 2 -3 0;4 -1 -2 0]

augA =

2 -3 1 0

1 2 -3 0

4 -1 -2 0

>> rank(A)

ans = 3

>> rank(augA)

ans = 3

>> augA(3,:)=augA(3,:)-2\*augA(1,:)

augA =

2 -3 1 0

1 2 -3 0

0 5 -4 0

>> augA(2,:)=2\*augA(2,:)-augA(1,:)

augA =

2 -3 1 0

0 7 -7 0

0 5 -4 0

>> augA(3,:)=7\*augA(3,:)-5\*augA(2,:)

augA =

2 -3 1 0

0 7 -7 0

0 0 7 0

>> augA(2,:)=augA(2,:)/7

augA =

2 -3 1 0

0 1 -1 0

0 0 7 0

>> augA(1,:)=augA(1,:)/2

augA =

1.00000 -1.50000 0.50000 0.00000

0.00000 1.00000 -1.00000 0.00000

0.00000 0.00000 7.00000 0.00000

>> augA(3,:)=augA(3,:)/7

augA =

1.00000 -1.50000 0.50000 0.00000

0.00000 1.00000 -1.00000 0.00000

0.00000 0.00000 1.00000 0.00000

>> rref(augA)

ans =

1 0 0 0

0 1 0 0

0 0 1 0

**Q10**) **x+2y+3z = 0**

**2x+3y+4z = 0**

**7x+13y+9z = 0**

>> A=[1 2 3; 2 3 4;7 13 9]

A =

1 2 3

2 3 4

7 13 9

>> b=[0 0 0]

b =

0 0 0

>> augA=[1 2 3 0; 2 3 4 0;7 13 9 0]

augA =

1 2 3 0

2 3 4 0

7 13 9 0

>> rank(A)

ans = 3

>> rank(augA)

ans = 3

>> augA(3,:)=augA(3,:)-7\*augA(1,:)

augA =

1 2 3 0

2 3 4 0

0 -1 -12 0

>> augA(2,:)=augA(2,:)-2\*augA(1,:)

augA =

1 2 3 0

0 -1 -2 0

0 -1 -12 0

>> augA(3,:)=augA(3,:)-augA(2,:)

augA =

1 2 3 0

0 -1 -2 0

0 0 -10 0

>> augA(2,:)=-1\*augA(2,:)

augA =

1 2 3 0

-0 1 2 -0

0 0 -10 0

>> augA(3,:)=augA(3,:)/10

augA =

1 2 3 0

-0 1 2 -0

0 0 -1 0

>> augA(3,:)=augA(3,:)/-1

augA =

1 2 3 0

-0 1 2 -0

-0 -0 1 -0

>> rref(augA)

ans =

1 0 0 0

-0 1 0 -0

-0 -0 1 -0

**Q11) . x-y+2z-3w = 0**

**3x+2y-4z+w = 0**

**5x-3y+2z+6w = 0**

>> A=[1 2 3; 2 3 4;7 13 9]

A =

1 2 3

2 3 4

7 13 9

>> b=[0 0 0]

b =

0 0 0

>> augA=[1 2 3 0; 2 3 4 0;7 13 9 0]

augA =

1 2 3 0

2 3 4 0

7 13 9 0

>> rank(A)

ans = 3

>> rank(augA)

ans = 3

>> augA(3,:)=augA(3,:)-7\*augA(1,:)

augA =

1 2 3 0

2 3 4 0

0 -1 -12 0

>> augA(2,:)=augA(2,:)-2\*augA(1,:)

augA =

1 2 3 0

0 -1 -2 0

0 -1 -12 0

>> augA(3,:)=augA(3,:)-augA(2,:)

augA =

1 2 3 0

0 -1 -2 0

0 0 -10 0

>> augA(2,:)=-1\*augA(2,:)

augA =

1 2 3 0

-0 1 2 -0

0 0 -10 0

>> augA(3,:)=augA(3,:)/10

augA =

1 2 3 0

-0 1 2 -0

0 0 -1 0

>> augA(3,:)=augA(3,:)/-1

augA =

1 2 3 0

-0 1 2 -0

-0 -0 1 -0

>> rref(augA)

ans =

1 0 0 0

-0 1 0 -0

-0 -0 1 -0

**Q12) . x+3y+4z+7w = 0**

**2x+4y+5z+8w = 0**

**3x+y+2z+3w = 0**

>> A=[1 -1 2 -3;3 2 -4 1;5 -3 2 6]

A =

1 -1 2 -3

3 2 -4 1

5 -3 2 6

>> b=[0 0 0]

b =

0 0 0

>> augA=[1 -1 2 -3 0;3 2 -4 1 0;5 -3 2 6 0]

augA =

1 -1 2 -3 0

3 2 -4 1 0

5 -3 2 6 0

>> rank(A)

ans = 3

>> rank(augA)

ans = 3

>> augA(3,:)=augA(3,:)-5\*augA(1,:)

augA =

1 -1 2 -3 0

3 2 -4 1 0

0 2 -8 21 0

>> augA(2,:)=augA(2,:)-3\*augA(1,:)

augA =

1 -1 2 -3 0

0 5 -10 10 0

0 2 -8 21 0

>> augA(3,:)=5\*augA(3,:)-2\*augA(2,:)

augA =

1 -1 2 -3 0

0 5 -10 10 0

0 0 -20 85 0

>> augA(2,:)=augA(2,:)/5

augA =

1 -1 2 -3 0

0 1 -2 2 0

0 0 -20 85 0

>> augA(3,:)=augA(3,:)/-20

augA =

1.00000 -1.00000 2.00000 -3.00000 0.00000

0.00000 1.00000 -2.00000 2.00000 0.00000

-0.00000 -0.00000 1.00000 -4.25000 -0.00000

>> rref(augA)

ans =

1.00000 0.00000 0.00000 -1.00000 0.00000

0.00000 1.00000 0.00000 -6.50000 0.00000

-0.00000 -0.00000 1.00000 -4.25000 -0.00000

>> A=[1 3 4 7;2 4 5 8;3 1 2 3]

A =

1 3 4 7

2 4 5 8

3 1 2 3

>> b=[0 0 0]

b =

0 0 0

>> augA=[1 3 4 7 0;2 4 5 8 0;3 1 2 3 0]

augA =

1 3 4 7 0

2 4 5 8 0

3 1 2 3 0

>> rank(A)

ans = 3

>> rank(augA)

ans = 3

>> augA(3,:)=augA(3,:)-3\*augA(1,:)

augA =

1 3 4 7 0

2 4 5 8 0

0 -8 -10 -18 0

>> augA(2,:)=augA(2,:)-2\*augA(1,:)

augA =

1 3 4 7 0

0 -2 -3 -6 0

0 -8 -10 -18 0

>> augA(3,:)=augA(3,:)-4\*augA(2,:)

augA =

1 3 4 7 0

0 -2 -3 -6 0

0 0 2 6 0

>> augA(2,:)=augA(2,:)/-2

augA =

1.00000 3.00000 4.00000 7.00000 0.00000

-0.00000 1.00000 1.50000 3.00000 -0.00000

0.00000 0.00000 2.00000 6.00000 0.00000

>> augA(3,:)=augA(3,:)/2

augA =

1.00000 3.00000 4.00000 7.00000 0.00000

-0.00000 1.00000 1.50000 3.00000 -0.00000

0.00000 0.00000 1.00000 3.00000 0.00000

>> rref(augA)

ans =

1.00000 0.00000 0.00000 -0.50000 0.00000

-0.00000 1.00000 0.00000 -1.50000 -0.00000

0.00000 0.00000 1.00000 3.00000 0.00000

**Que 2.**

To check that given matrix is a diagonally dominant matrix

A =[10 -2 -1 -1;-2 10 -1 -1;-1 -1 10 -2;-1 -1 -2 10];

[m, n]=size(A);

c=0;

for i=1:m

sum=0;

for j=1:n

if(i~=j)

sum=sum+A(i,j);

end

end

if(A(i,i)>sum)

c=c+1;

else

break

end

end

if (c==n)

disp('Matrix is Diagonally Dominant')

else

disp('Matrix is not Diagonally Dominant')

end

>> diagonally\_dominant

Matrix is Diagonally Dominant

Therefore,

%Solving Ax=B by Gauss Jacobi Method

A=[10 -2 -1 -1;-2 10 -1 -1;-1 -1 10 -1;-1 -1 -2 10];

B=[3;15;27;-9];

x1(1)=0;x2(1)=0;x3(1)=0;x4(1)=0;

for i = 1:12

x1(i+1) =(B(1)-( A(1,2)\*x2(i))-(A(1,3)\*x3(i))-(A(1,4)\*x4(i)))/A(1,1);

x2(i+1) =(B(2)-( A(2,1)\*x1(i))-(A(2,3)\*x3(i))-(A(2,4)\*x4(i)))/A(2,2);

x3(i+1) =(B(3)-( A(3,1)\*x1(i))-(A(3,2)\*x2(i))-(A(3,4)\*x4(i)))/A(3,3);

x4(i+1) =(B(4)-( A(4,1)\*x1(i))-(A(4,2)\*x2(i))-(A(4,3)\*x3(i)))/A(4,4);

end

Output

>> gauss\_jacobi\_g

>> x1

x1 =

0 0.3000 0.7800 0.9090 0.9678 0.9875 0.9954 0.9983 0.9994 0.9998 0.9999 1.0000 1.0000

>> x2

x2 =

0 1.5000 1.7400 1.9170 1.9662 1.9879 1.9954 1.9983 1.9994 1.9998 1.9999 2.0000 2.0000

>> x3

x3 =

0 2.7000 2.7900 2.9340 2.9736 2.9903 2.9964 2.9986 2.9995 2.9998 2.9999 3.0000 3.0000

>> x4

x4 =

0 -0.9000 -0.1800 -0.0900 -0.0306 -0.0119 -0.0044 -0.0017 -0.0006 -0.0002 -0.0001 -0.0000 -0.0000

So from our output of gauss jacobi method we get,

x1 = 1 , x2 = 2 , x3 = 3 , x4 = 0

% Solving Ax=B using Gauss Seidel method

A=[10 -2 -1 -1;-2 10 -1 -1;-1 -1 10 -1;-1 -1 -2 10];

B=[3;15;27;-9];

C=[A B];

%Initializing

n=4;

x=zeros(n,1);

err=zeros(n,1);

%% G-S Iteration

for iter = 1:7

for k= 1:n

xold = x(k);

num = C(k,end)-C(k,1:k-1)\*x(1:k-1)-C(k,k+1:n)\*x(k+1:n);

x(k)= num/C(k,k);

err(k ) = abs(x(k)-xold);

end

disp(['Iter',num2str(iter), '; Error = ', num2str(max(err))])

end

Output

>> gauss\_seidal

Iter1; Error = 2.886

Iter2; Error = 0.58692

Iter3; Error = 0.098362

Iter4; Error = 0.012327

Iter5; Error = 0.0020241

Iter6; Error = 0.00031058

Iter7; Error = 4.7872e-05

>> x

x =

1.0000

2.0000

3.0000

-0.0000

So that from Gauss seidal method we get,

x1 = 1 , x2 = 2 , x3 = 3 , x4 = 0