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

**DEPARTMENT OF STATISTICS.(Autonomous)**

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

**EXPT.NO. 3 Date:**

**Title : Solution of simultaneous transcendental equation using Newton Raphson method.**

**Q1.Solve the following equation using Newton Raphson method.**

**X2+Y=3**

**Y2+X=3 Take X0=Y0=1.3**

**Q2. Solve the following equation using Newton Raphson method.**

**0.2X2-X+0.8=0**

**0.3XY2-Y+0.7=0** **Take X0=Y0=0.5**

**Q3. Solve the following equation using Newton Raphson method.**

**X2=3XY-7**

**Y=2(X+1) Take X0= 0.7 Y0=3.4**

**Q4. Solve the following equation using Newton Raphson method.**

**X3+Y3+Z3=64**

**X+Y+Z=7.3**

**XYZ=9**

**Take initial solution vector [1 2 3]**

**Q1.Solve the following equation using Newton Raphson method.**

**X2+Y=3**

**Y2+X=3 Take X0=Y0=1.3**

**Solution :**

x=rep(0,10)

> y=rep(0,10)

> d=0.001

> for(i in 2:10)

+ {

+ x[1]=1.3;y[1]=1.3

+ f=((x[i-1])^2)+(y[i-1])-3

+ g=((y[i-1])^2)+(x[i-1])-3

+ fx=(2\*x[i-1])

+ gx=1

+ fy=1

+ gy=(2\*y[i-1])

+ dx=((gy\*f)-(fy\*g))/((fx\*gy)-(fy\*gy))

+ dy=((fx\*g)-(gx\*f))/((fx\*gy)-(fy\*gy))

+ x[i]=x[i-1]-dx

+ y[i]=y[i-1]-dy

+ if((x[i-1]-x[i]<d)&&(y[i-1]-y[i]<d))

+ a=data.frame(x,y)

+ }

> a

x y

1 1.300000 1.300000

2 1.303846 1.303846

3 1.302366 1.302366

4 1.302933 1.302933

5 1.302715 1.302715

6 1.302799 1.302799

7 1.302767 1.302767

8 1.302779 1.302779

9 1.302774 1.302774

10 1.302776 1.302776

.

**Q2. Solve the following equation using Newton Raphson method.**

**0.2X2-X+0.8=0**

**0.3XY2-Y+0.7=0** **Take X0=Y0=0.5**

**Solution:**

x=rep(0,7)

> y=rep(0,7)

> d=0.001

> for(i in 2:7)

+ {

+ x[1]=0.5;y[1]=0.5

+ f=(0.2\*(x[i-1])^2)-x[i-1]+0.8

+ fx=(0.4\*x[i-1])-1

+ fy=0

+ g=(0.3\*x[i-1]\*(y[i-1])^2)-y[i-1]+0.7

+ gx=0.3\*((y[i-1])^2)

+ gy=(0.6\*y[i-1]\*x[i-1])-1

+ dx=((gy\*f)-(fy\*g))/((fx\*gy)-(fy\*gx))

+ dy=((fx\*g)-(gx\*f))/((fx\*gy)-(fy\*gx))

+ x[i]=x[i-1]-dx

+ y[i]=y[i-1]-dy

+ if((x[i-1]-x[i]<d)&&(y[i-1]-y[i]<d))

+ a=data.frame(x,y)

+ }

> a

x y

1 0.5000000 0.5000000

2 0.9375000 0.8180147

3 0.9987500 0.9707909

4 0.9999995 0.9993368

5 1.0000000 0.9999997

6 1.0000000 1.0000000

7 1.0000000 1.0000000

**Q3. Solve the following equation using Newton Raphson method.**

**X2=3XY-7**

**Y=2(X+1) Take X0= 0.7 Y0=3.4**

**Solution:**

x=rep(0,10)

> y=rep(0,10)

> d=0.001

> for(i in 2:10)

+ {

+ x[1]=0.7;y[1]=3.4

+ f=((x[i-1])^2)-3\*x[i-1]\*y[i-1]+7

+ g=2\*x[i-1]-y[i-1]+2

+ fx=2\*x[i-1]-3\*y[i-1]

+ gx=2

+ fy=-3\*x[i-1]

+ gy=-1

+ dx=((gy\*f)-(fy\*g))/((fx\*gy)-(fy\*gy))

+ dy=((fx\*g)-(gx\*f))/((fx\*gy)-(fy\*gy))

+ x[i]=x[i-1]-dx

+ y[i]=y[i-1]-dy

+ if((x[i-1]-x[i]<d)&&(y[i-1]-y[i]<d))

+ a=data.frame(x,y)

+ }

> a

x y

1 0.7000000 3.400000

2 0.7522388 3.504478

3 0.7014780 3.402956

4 0.7508365 3.501673

5 0.7028726 3.405745

6 0.7495115 3.499023

7 0.7041887 3.408377

8 0.7482595 3.496519

9 0.7054309 3.410862

10 0.7470764 3.494153

**Q4. Solve the following equation using Newton Raphson method.**

**X3+Y3+Z3=64**

**X+Y+Z=7.3**

**XYZ=9**

**Take initial solution vector [1 2 3]**

. x=rep(0,10)

> y=rep(0,10)

> z=rep(0,10)

> d=0.001

> for(i in 2:10)

+ {

+ x[1]=1;y[1]=2;z[1]=3

+ f=(x[i-1])^3+(y[i-1])^3+(z[i-1])^3-64

+ g=y[i-1]+x[i-1]+z[i-1]-7.3

+ h=x[i-1]\*y[i-1]\*z[i-1]

+ fx=3\*(x[i-1])^2

+ fy=3\*(y[i-1])^2

+ fz=3\*(z[i-1])^2

+ gx=1

+ gy=1

+ gz=1

+ hx=y[i-1]\*z[i-1]

+ hy=x[i-1]\*z[i-1]

+ hz=y[i-1]\*x[i-1]

+ dx=(((gy\*hz-gz\*hy)\*f)-((g\*hz-h\*gz)\*fy)+((g\*hy-gy\*h)\*fz))/(((gy\*hz-gz\*hy)\*fx)-((gx\*hz-hx\*gz)\*fy)+((gx\*hy-gy\*hx)\*fz))

+ dy=(((g\*hz-gz\*h)\*fx)-((gx\*hz-hx\*gz)\*f)+((gx\*h-g\*hx)\*fz))/(((gy\*hz-gz\*hy)\*fx)-((gx\*hz-hx\*gz)\*fy)+((gx\*hy-gy\*hx)\*fz))

+ dz=(((gy\*h-g\*hy)\*fx)-((gx\*h-hx\*g)\*fy)+((gx\*hy-gy\*hx)\*f))/(((gy\*hz-gz\*hy)\*fx)-((gx\*hz-hx\*gz)\*fy)+((gx\*hy-gy\*hx)\*fz))

+ x[i]=x[i-1]-dx

+ y[i]=y[i-1]-dy

+ z[i]=z[i-1]-dz

+ if((x[i-1]-x[i]<d)&&(y[i-1]-y[i]<d)&&(z[i-1]-z[i]<d))

+ a=data.frame(x,y,z)

+ }

> a

x y z

1 1.0000000 2.000000 3.000000

2 -1.5946970 4.263636 5.115909

3 -0.4846859 3.012955 3.321192

4 0.1290493 3.030821 3.693933

5 0.0000000 0.000000 0.000000

6 0.0000000 0.000000 0.000000

7 0.0000000 0.000000 0.000000

8 0.0000000 0.000000 0.000000

9 0.0000000 0.000000 0.000000

10 0.0000000 0.000000 0.000000