

Scilab Manual for
Numerical and Statistical Methods Laboratory
by Dr Keval Chandrakant Nikam
Mechanical Engineering
Savitribai Phule Pune University¹

Solutions provided by
Dr Keval Chandrakant Nikam
Mechanical Engineering
Savitribai Phule Pune University

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Experiment: 1

Program for roots of Equation using Bisection Method accuracy criteria

Scilab code Solution 1.1 Bisection Method

```
1 //Scilab code Solution 1 Program for roots of
   Equation using Bisection Method accuracy criteria
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 1
5 // Program for roots of Equation using Bisection
   Method accuracy criteria
6 // Example – Write a computer program in SCILAB
   to find root of equation as  $x^2-8x+2..$ 
7 //Take Accuracy as 0.01 using Bisection Method.Take
   x1=0 and x2=1
8 // Input x1=0,x2=1,acc=0.01,f(x)= $x^2-8*x+2$ 
9 clc;
10 clear;
11 close;
```

```

12 def f('y=f(x)', 'y=x^2-8*x+2')
13 x1=input('Enter First Initial Guess = ');
14 x2=input('Enter Second Initial Guess = ');
15 acc=input('Enter the value of Accuracy =');
16 i=0;
17 printf('Iteration \t x1 \t \t x2 \t \t z \t \t f(z)\n
n ')
18 while abs(x1-x2)>acc // Condition of Accuracy
19     z=(x1+x2)/2
20 printf('%i\t \t%f \t%f \t%f \t%f \n ',i,x1,x2,z,f(z)
)// Print in form of Table
21 if f(z)*f(x1)>0 // Substitution of initial guess
for next iteration
22     x1=z
23 else
24     x2=z
25 end
26     i=i+1 // Increment in Iteration by 1 for each
step
27 end
28 printf(' \n\n The solution of this equation is %g
after %i Iterations ',z,i-1)// Display final
answe to User

```

Experiment: 2

Program for roots of Equation using Newton Raphson Method accuracy criteria

Scilab code Solution 2.2 Newton Raphson Method

```
1 //Scilab code Solution 2 Program for roots of
   Equation using Newton Raphson Method accuracy
   criteria
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 2
5 // Program for roots of Equation using Newton
   Raphson Method accuracy criteria
6 // Example – Solve using Newton Raphson Method  $x - \exp(-x) = 0$ 
7 //Take accuracy as 0.001 .Take  $x_0=1$ 
8 //Input  $x_0=1, acc=0.001, f(x)=x - \exp(-x)$ 
9 clc;
10 clear;
11 close;
```



```

12 def f('y=f(x)', 'y=x-exp(-x)')
13 def f1('y=f1(x)', 'y=1+exp(-x)')
14 x0 = input('Enter Initial Guess = ');
15 acc = input('Enter the value of Accuracy = ');
16 i=0;
17 printf('i \t\t x0 \t\t x1 \n')
18 x1=x0-(f(x0)/f1(x0))
19 printf('%i\t\t%0.5f\t\t%0.5f \n', i, x0, x1)
20 while abs(x1-x0)>acc // Condition of Accuracy
21 x0=x1;
22 x1=x0-(f(x0)/f1(x0)) // Formula of finding root of
    Equation
23 i=i+1
24 printf('%i\t\t\t%f \t%f \n', i, x0, x1) // Print in
    form of Table
25 end
26 printf('\n\n The root of equation is %0.5f', x1) //
    Display final answer to User

```

Experiment: 3

Program for Simultaneous equations using Gauss Elimination Method

Scilab code Solution 3.3 Gaussian Elimination method

```
1 //Scilab code Solution 3 Program for Simultaneous
   equations using Guass Elimination Method
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 3
5 // Program for Simultaneous equations using Guass
   Elimination Method
6 // Example – Write a computer program in SCILAB
   to solve following set of simultaneous
   equations using Guass Elimination method.
7 //3 X + 2Y + Z = 10
8 //2 X + 3 Y + 2Z = 14
9 //X + 2Y + 3Z = 14
10 // Input coeffienct matrix a and solution matrix b
11 clc;
```

```

12 clear all;
13 disp('OUTPUT: ');
14 a=input('Enter coefficient matrix a:= ');
15 b=input('Enter matrix b:= ');
16 [m,n]=size(a);
17 if m~=n // Check condition of square matrix
18     error('Matrix A must be square');
19 end
20 //Perform Partial Pivoting
21 for i=1:1:n-1
22     for u=i+1:1:n
23         if (abs(a(u,i))>abs(a(i,i))) // Comparison
                of Pivot Element
24             for v=1:1:n
25                 temp=a(i,v); // Replacement of Pivot
                Element
26                 a(i,v)=a(u,v);
27                 a(u,v)=temp;
28             end
29             temp=b(i);
30             b(i)=b(u);
31             b(u)=temp;
32         end
33     end
34 //Gauss Elimination – operation of Rows
35     for k=i+1:1:n
36         factor=a(k,i)/a(i,i);
37         for j=1:1:n
38             a(k,j)=a(k,j)-factor*a(i,j); // Formula to
                make Coefficient Matrix in Upper
                Triangular Matrix
39         end
40         b(k)=b(k)-factor*b(i); // Formula also
                applicable to solution matrix
41     end
42 end
43 disp('Final augmented matrix is:');
44 disp([a,b]); //Display formed Upper Triangular Matrix

```

```
45 // Back Substitution
46 for i=n:-1:1
47     temp=b(i);
48     for j=i+1:1:n
49         temp=temp-a(i,j)*x(j);
50     end
51     x(i)=temp/a(i,i); // Calculating the value of x
                        (3),x(2) and x(1) resp.
52 end
53 disp('Answer is:');
54 disp(x);
```

Experiment: 4

Program for Ordinary differential equation using Euler Method

Scilab code Solution 4.4 Euler method

```
1 //Scilab code Solution 4 Program for Ordinary
   differential equation using Euler Method
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 4
5 // Program for Ordinary differential equation using
   Euler Method
6 // Example – Write a computer program in SCILAB to
   solve the ODE
7 //dy/dx=-x*y^2 using Eulers method under the
   condition x=0,y=2.Find y at x=1 with h=0.1.
8 //Input function -xy^2,x0=0,y0=2,xn=1,h=0.1
9 clc;
10 close;
11 clear;
```

```

12 deff ('y=f(x,y)', 'y=-x*y^2'); // Enter the Function
13 x0=input('Enter the value of x0=');
14 y0=input('Enter the value of y0=');
15 xn=input('Enter the value of xn=');
16 h=input('Enter the value of h=');
17 n=(xn-x0)/h; // Formuale for finding number of Step
    Size
18 disp(n)
19 for i=1:1:n
20     yn=y0+h*f(x0,y0); // Formulae use in Euler Method
21     x0=x0+h; // Increment in Step size
22     y0=yn; // Replacement of y0 as yn for next
        iteration
23     printf('Value of y(%f)=%f\n',x0,y0);
24 end

```

Experiment: 5

Program for Ordinary differential equation using Runge Kutta 4th order

Scilab code Solution 5.5 RK4ORDER

```
1 //Scilab code Solution 5 Program for Ordinary
   differential equation using Runge–Kutta 4th order
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 5
5 // Program for Ordinary differential equation using
   Runge–Kutta 4th order
6 // Example – Write a computer program in SCILAB to
   obtain the numerical solution of
7 //dy/dx=x^2+y^2, y(0)=0,h=0.2.Estimate y(0.4) using
   Runge Kutta 4 order method
8 //Input function x^2+y^2,x0=0,y0=0,h=0.2,xn=0.4
9 clc;
10 close;
11 clear;
```

```

12 deff ('y=f(x,y,z)', 'y=x*x+y*y'); // Enter the Function
13 x0=input('Enter the value of x0=');
14 y0=input('Enter the value of y0=');
15 xn=input('Enter the value of xn=');
16 h=input('Enter the value of h=');
17 n=(xn-x0)/h; // Formuale for finding number of Step
    Size
18 disp(n)
19 for i=1:1:n
20     k1=h*f(x0,y0); // Calculate value of k1
21     k2=h*f(x0+h/2,y0+k1/2); // Calculate value of k2
22     k3=h*f(x0+h/2,y0+k2/2); // Calculate value of k3
23     k4=h*f(x0+h,y0+k3); // Calculate value of k4
24     k=(k1+2*k2+2*k3+k4)/6.0; // Calculate value of k
25     yn=y0+k; // Increment in Step size
26     x0=x0+h; // Increment in Step size
27     y0=yn; // Replacement of z0 as z1 for next
        iteration
28     printf('Value of y(%f)=%f\n',x0,y0); // Display y(
        n)
29 end

```

Experiment: 6

Program for Ordinary differential equation using Simultaneous equations using Runge Kutta 2nd order method

Scilab code Solution 6.6 RK2Order Simultaneous

```
1 //Scilab code Solution 6 Program for Ordinary
   differential equation using Simultaneous
   equations using Runge–Kutta 2nd order method
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 6
5 // Program for Ordinary differential equation using
   Simultaneous equations using Runge–Kutta 2nd
   order method
6 // Example – Write a computer program in SCILAB to
   to solve the equation
7 //dy/dx=-0.5*y, dz/dx=4-0.3*z-0.1*y Using runge kutta
   second order simultaneous method where at x = 0,
   y =4, z =6.
8 //Find y & z at x = 0.5 (take h=0.5)
```

```

9 //Input function  $f(x,y,z)=-0.5*y$ ,  $g(x,y,z)=4-0.3*z$ 
    $-0.1*y$ ,  $x_0=0,y_0=4,z_0=6,h=2,x_n=0.5$ 
10 clc;
11 clear;
12 deff ('y=f(x,y,z)', 'y=-0.5*y'); // Enter the Function
13 deff ('z=g(x,y,z)', 'z=4-0.3*z-0.1*y'); // Enter the
   Function
14  $x_0$ =input('Enter the value of  $x_0$ =');
15  $y_0$ =input('Enter the value of  $y_0$ =');
16  $z_0$ =input('Enter the value of  $z_0$ =');
17  $x_n$ =input('Enter the value of  $x_n$ =');
18  $h$ =input('Enter the value of  $h$ =');
19  $n=(x_n-x_0)/h$ ; // Formuale for finding number of Step
   Size
20 for  $i=1:1:n$ 
21    $k_1=h*f(x_0,y_0,z_0)$ ; // Calculate value of  $k_1$ 
22    $L_1=h*g(x_0,y_0,z_0)$ ; // Calculate value of  $L_1$ 
23    $k_2=h*f(x_0+h,y_0+k_1,z_0+L_1)$ ; // Calculate value of  $k_2$ 
24    $L_2=h*g(x_0+h,y_0+k_1,z_0+L_1)$ ; // Calculate value of  $L_2$ 
25    $k=(k_1+k_2)/2.0$ ; // Finding out increment in y
   direction
26    $y_1=y_0+k$ ; // Increment in Step size
27    $L=(L_1+L_2)/2.0$ ; // Finding out increment in z
   direction
28    $z_1=z_0+L$ ; // Increment in Step size
29    $x_0=x_0+h$ ; // Increment in Step size
30    $y_0=y_1$ ; // Replacement of  $y_0$  as  $y_1$  for next
   iteration
31    $z_0=z_1$ ; // Replacement of  $z_0$  as  $z_1$  for next
   iteration
32   printf('value of  $y$ (%f)=%f\n',  $x_0,y_0$ ); // Display  $y(n$ 
   )
33   printf('value of  $z$ (%f)=%f\n',  $x_0,z_0$ ); // Display  $z(n$ 
   )
34 end

```

Experiment: 7

Program for Partial differential equation using Simple Laplace method

Scilab code Solution 7.7 Laplace Method

```
1 //Scilab code Solution 7    Program for Partial
    differential equation using Simple Laplace method
2 // Operating System  Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 7
5 // Program for Partial differential equation using
    Simple Laplace method
6 // Example – A steel Plate of 750x750mm has its two
    adjacent sides maintained at
7 //100 C .While the two other sides are maintained at
    0 C .What will be the
8 //steady state temperature at interior assuming a
    grid size of 250mm.Solve upto 11 iteration
```

```

9 //Input function n1=11,n=4,m=4,u(1,1)=0,u(2,1)=0,u
  (3,1)=0,u(4,1)=0
10 //u(4,2)=0,u(4,3)=0,u(4,4)=0,u(3,4)=100,u(2,4)=100,u
  (1,4)=100
11 //u(1,3)=100,u(1,2)=100
12 clc;
13 clear;
14 n1=input('Enter the no. of iteration to solve
  simultaneous eqn:');
15 n=input(' Enter the no. of mesh point(No. of B.V.
  values) in x-direction:');
16 m=input(' Enter the no. of mesh point(No. of B.V.
  values) in y-direction:');
17 printf(' Enter boundary value(B.V.) in anticlockwise
  direction Starting from bottom left corner\n');
18 u=zeros(m,n); //to create matrix of total size and
  to take initial guess as 0,0,0...
19 for i=1:n// to take input as a boundary value at
  bottom side
20   printf('Enter u(%d,1)=' ,i);
21   u(i,1)=input(' ');
22 end
23 for j=2:m //to take I/P at Right hand side B.V.
  bottom to top
24   printf('Enter u(%d,%d)=' ,n,j);
25   u(n,j)=input(' ');
26 end
27 for i=n-1:-1:1 // to take I/P at top side B.V. right
  to left
28   printf('Enter u(%d,%d)=' ,i,m);
29   u(i,m)=input(' ');
30 end
31 for j=m-1:-1:2 //to take I/P at left hand side B.V.
  top to bottom
32   printf('Enter u(1,%d)=' ,j);
33   u(1,j)=input(' ');
34 end
35 for k=1:n1 // To repeat n1 iterations

```

```

36     for j=2:m-1 //To calculate value at intermediate
        point by Gauss Seidal method
37         for i=2:n-1
38             u(i,j)=1/4*(u(i-1,j)+u(i,j+1)+u(i+1,j)+u(i,
                j-1)); // Formula for finding Internal
                Elements
39         end
40     end
41     printf('Value after iteration no.:%d\n',k);
42     for j=m:-1:1 //To print value after each
        Iteration in Tabulated form
43         for i=1:n
44             printf('\t %0.4f \t',u(i,j));
45         end
46         printf('\n');
47     end
48 end

```

Experiment: 8

Program for Numerical Integration using Trapezoidal rule

Scilab code Solution 8.8 TrapezoidalRule

```
1 //Scilab code Solution> 8 Program for Numerical
  // Integration using Trapezoidal rule
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 8
5 // Program for Numerical Integration using
  // Trapezoidal rule
6 // Example – Write a computer program in SCILAB to
  // solve integration  $4*x+2$ 
7 //limits  $x_0=0,x_n=1$  by using Trapezoidal Method.
8 //Take  $h=0.5$ .
9 //Program on Trapezoidal Rule
10 clc;
11 close;
12 clear;
```

```
13 def f('y=f(x)', 'y=4*x+2'); // Enter the Function
14 x0=input('Enter lower limit:'); // Enter Lower Limit
15 xn=input('Enter upper limit:'); // Enter Upper Limit
16 h=input('Enter step Size h:'); // Enter Step Size
17 x=x0;
18 n=(xn-x0)/h; // Enter number of Step size
19 s=0;
20 for i=1:n-1
21     x=x+h;
22     s=s+2*f(x);
23 end
24 s=f(x0)+s+f(xn);
25 I=h/2*s; // Formula for finding Area by using
    Trapezoidal Rule
26 printf('Integration of given function is=%f\n',I);
```

Experiment: 9

Program for Numerical Integration using Simpsons 1/3rd Rule

Scilab code Solution 9.9 Simpson 1 3rd Rule

```
1 //Scilab code Solution 9      Program for Numerical
   // Integration using Simpsons 1/3 rd Rule
2 // Operating System  Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 9
5 // Program for Numerical Integration using
   // Simpsons 1/3 rd Rule
6 // Example – Write a Program in Scilab for finding
   // area of fuction (sin(x))/(2+3*sin(x)) for
7 //upper limit of 1 and lower limit of 0.Take n=6 by
   // using Simpson's 1/3 Rule
8 //Program on Simpson's 1/3rd Rule
9 clc;
10 clear;
11 deff('y=f(x)', 'y=(sin(x))/(2+3*sin(x))'); // Enter
```

```

    the Function
12 x0=input('Enter lower limit:'); // Enter the lower
    limit of x
13 xn=input('Enter upper limit:'); // Enter the upper
    limit of x
14 n=input('Enter number of steps:'); // Enter the
    number of steps
15 x=x0;
16 h=(xn-x0)/n; // Calculate step size
17 s=0;
18 for i=1:n-1
19     x=x+h;
20     if modulo(i,2)==0 // Calculating Even Term of
        Simpson 1/3rd Formula
21         s=s+2*f(x);
22     else
23         s=s+4*f(x);
24     end
25 end
26 s=f(x0)+s+f(xn);
27 I=(h/3)*s; // Finding Integrating value
28 printf('\nIntegration of given function is=%f\n',I);
    // Display Value

```

Experiment: 10

Program for Numerical Integration using Simpsons 3/8th Rule.

Scilab code Solution 10.10 Simpson 3 8th Rule

```
1 //Scilab code Solution 10 Program for Numerical
  Integration using Simpsons 3/8 Rule
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 10
5 // Program for Numerical Integration using
  Simpsons 3/8 Rule
6 // Example – Write a Program in Scilab for finding
  area of fuction exp(x)/x for
7 //upper limit of 2 and lower limit of 1.Take n=6 by
  using Simpson's 3/8 Rule
8 //Program on Simpson's 3/8th Rule
9 clc;
10 close;
11 clear;
```

```

12 deff('y=f(x)', 'y=exp(x)/x'); // Enter function
13 x0=input('Enter lower limit:'); // Enter lower limit
    of x
14 xn=input('Enter upper limit:'); // Enter upper limit
    of x
15 n=input('Enter number of steps:'); // Enter number of
    step
16 x=x0;
17 h=(xn-x0)/n; // Finding out of step size
18 s=0;
19 for i=1:n-1
20     x=x+h;
21     if modulo(i,3)==0 // Condition for adding the odd
        value together
22         s=s+2*f(x);
23     else
24         s=s+3*f(x);
25     end
26 end
27 s=f(x0)+f(xn)+s;
28 I=((3*h)/8)*s; // Calculating Area
29 printf(' \nIntegration of given function is=%f\n',I);

```

Experiment: 11

Program for Numerical Integration using Gauss Quadrature 2-point and 3-point method

Scilab code Solution 11.11 Gauss 2 and 3 Point Method

```
1 //Scilab code Solution 11 Program for Numerical
  Integration using Gauss Quadrature 2-point and 3-
  point method
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 11
5 // Program for Numerical Integration using Gauss
  Quadrature 2-point and 3-point method
6 // Example – Write a Program in Scilab to solve
  using two-point or three point Gauss quadrature
  rule to
7 //approximate the distance covered by a rocket from
  t = 8 to t = 30 as given by
8 //x=(2000*log(140000/(140000-2100*t))-9.8*t)
9 // Enter a=lower limit=8,b=upper limit=30,n=Enter 2
```

```

    or 3 depend upon Gauss 2 point or 3 point formula
10 //Program on Gauss Quadrature 2–point and 3–point
    method
11 clc;
12 clear;
13 deff('x=f(t)', 'x=(2000*log(140000/(140000–2100*t))
    –9.8*t)'); // Enter the function
14 a=input('Enter lower limit:'); // Enter the lower
    limit of Integration
15 b=input('Enter upper limit:'); // Enter the upper
    limit of Integration
16 n=input('Enter 2 point or 3 point method:'); // Enter
    which method you are suppose to use
17 if n==2 // For executing 2 Point Method
18     c=(b-a)/2;
19     d=(b+a)/2;
20     z1=-1/sqrt(3);
21     z2=1/sqrt(3);
22     x1=c*z1+d;
23     x2=c*z2+d;
24     I=c*(f(x1)+f(x2)); // Formula for finding
        Integration value
25 else // For executing 3 Point Method
26     c=(b-a)/2;
27     d=(b+a)/2;
28     z1=sqrt(3/5);
29     z2=-sqrt(3/5);
30     x1=c*z1+d;
31     x2=c*z2+d;
32     x3=d;
33     I=c*(5/9*f(x1)+5/9*f(x2)+8/9*f(x3)); // Formula
        for finding Integration value
34 end
35 printf('\\n Integration of given function is=%f\\n',I)
    ; // Display the Integration

```

Experiment: 12

Program for Numerical Double Integration using Trapezoidal rule

Scilab code Solution 12.12 Trapezoidal Double Rule

```
1 //Scilab code Solution 12 Program for Numerical
   Double Integration using Trapezoidal rule
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 12
5 // Program for Numerical Double Integration using
   Trapezoidal rule
6 // Example – Write a Program in Scilab for finding
   area of fuction x+y for
7 //upper limit of 0 and lower limit of 1 for x,y.Take
   n=m=6 by using Numerical Double Integration
   using Trapezoidal rule
8 //Take f(x,y)=x+y,x0=0,xn=1,y0=0,yn=1,n=m=6
9 // Program for Numerical Double Integration using
   Trapezoidal rule
```



```

10 clc;
11 close;
12 clear;
13 deff('y=f(x,y)', 'y=x+y'); // Enter function
14 x0=input('Enter x0 lower limit of x:'); // Enter
    lower limit of x
15 xn=input('Enter xn upper limit of x:'); // Enter
    upper limit of x
16 n=input('Enter no. of steps in x-direction:'); //
    Enter number of step size in x axis
17 y0=input('Enter y0 lower limit of y:'); // Enter
    lower limit of y
18 ym=input('Enter ym upper limit of y:'); // Enter
    upper limit of y
19 m=input('Enter no. of steps in y-direction:'); //
    Enter number of step size in y axis
20 h=(xn-x0)/n; // Enter step size in x axis
21 k=(ym-y0)/m; // Enter step size in y axis
22 s=0;
23 x=x0; // Replacement of x by x0
24 y=y0; // Replacement of y by y0
25 for i=1:1:m+1
26     for j=1:1:n+1
27         a(i,j)=f(x,y); // Alloting pivot point by
            putting value in function
28         x=x+h; //Increment in x axis
29     end
30     y=y+k; //Increment in y axis
31     x=x0;
32 end
33 disp([a]);
34 for i=1:1:m
35     for j=1:1:n
36         s=s+a(i,j)+a(i,j+1)+a(i+1,j)+a(i+1,j+1);
37     end
38 end
39 I=h*k/4*s; // Calculating the Area
40 printf('Integration of given function is=%f\n',I);

```

```
// Display the Area
```

Experiment: 13

Program for Curve fitting using least square technique for first order equation

Scilab code Solution 13.13 First Order Equation

```
1 //Scilab code Solution 13   Program for Curve
   fitting using least square technique for first
   order equation
2 // Operating System   Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 13
5 // Program for Curve fitting using least square
   technique for first order equation
6 // Example – Write a computer program in SCILAB to
   fit a straight line to the data given below :
7 // x=[1 2 3 4 5 6 7];
8 //y=[0.5 2.5 2.0 4.0 3.5 6.0 5.5];
9
10 clc;
11 close;
```

```

12 clear;
13 //x=input('enter value of x matrix ')
14 x=[1 2 3 4 5 6 7];// Enter the x values (Dependent
    Variables)
15 disp([x]);
16 //y=input('enter value of y matrix ')
17 y=[0.5 2.5 2.0 4.0 3.5 6.0 5.5];// Enter the y
    values(Independent Variables)
18 disp([y]);
19 n=length(x);// Enter the data in x values
20 Y=y;
21 X=x;
22 X2=X.*X;// Calculating X*X Values( .* indicates that
    multiplication between respective value of x)
23 XY=X.*Y;// Calculating X*y Values( .* indicates that
    multiplication between respective value of x and
    y)
24 a0=(sum(Y)*sum(X2)-sum(X)*sum(XY))/(n*sum(X2)-(sum(X)
    )^2)); // Calculating coefficient a0
25 a1=((n*sum(XY)-sum(X)*sum(Y))/(n*sum(X2)-(sum(X))^2)
    );// Calculating coefficient a1
26 a=a1;//Replacement value of a
27 b=a0;//Replacement value of b
28 printf('\n y=%f*x+%f',a,b);// Display y=ax+b

```

Experiment: 14

Program for Curve fitting using least square technique for power equation

Scilab code Solution 14.14 Power Equation

```
1 //Scilab code Solution 14 Program for Curve
   fitting using least square technique for power
   equation
2 // Operating System Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 14
5 // 14 Program for Curve fitting using least square
   technique for power equation
6 // Example – Write a computer program in SCILAB to
   fit a power equation  $y=ax^b$  to the data given
   below :
7 // x=[1 2 3 4 5];
8 //y=[0.5 1.7 3.4 5.7 8.4];
9 // Program for Curve fitting using least square
   technique for power equation
```

```

10 clc;
11 close;
12 clear;
13 //x=input('enter value of x matrix ')
14 x=[1 2 3 4 5]; // Enter X values( Dependent Variables
    )
15 disp([x]);
16 //y=input('enter value of y matrix ')
17 y=[0.5 1.7 3.4 5.7 8.4]; // Enter Y Values(
    Independent variables)
18 disp([y]);
19 n=length(x); // calculate length of x
20 Y=log(y); // Calculate value of Y
21 X=log(x); // Calculate value of X
22 X2=X.*X; // Calculate value of X*X
23 XY=X.*Y // Calculate value of X*Y
24 a0=(sum(Y)*sum(X2)-sum(X)*sum(XY))/(n*sum(X2)-(sum(X)
    )^2)); // Calculating coefficient a0
25 a1=((n*sum(XY)-sum(X)*sum(Y))/(n*sum(X2)-(sum(X))^2)
    ); // Calculating coefficient a1
26 a=exp(a0); // Replacement of value
27 b=a1; //Replacement of value
28 printf(' \n y=%f*x^%f',a,b); //Display y= ax^b

```

Experiment: 15

Program for Curve fitting using least square technique for exponential equation

Scilab code Solution 15.15 Exponential Equation

```
1 //Scilab code Solution 15   Program for Curve
   fitting using least square technique for
   exponential equation
2 // Operating System   Windows 7
3 // SCILAB version 6.1.1
4 // Experiment No 15
5 // 15   Program for Curve fitting using least square
   technique for exponential equation
6 // Example – Write a computer program in SCILAB to
   fit a exponential equation  $y=ae^{bx}$  to the data
   given below :
7 //  $x=[1\ 3\ 5\ 7\ 9]$ ;
8 // $y=[2.473\ 6.722\ 18.274\ 49.673\ 135.026]$ ;
9 //   Program for Curve fitting using least square
   technique for exponential equation
10 clc;
11 close;
```

```

12 clear;
13 //x=input('enter value of x matrix ')
14 x=[1.0 3.0 5.0 7.0 9.0]; // Enter x values (Dependent
    Variables)
15 disp([x]);
16 //y=input('enter value of y matrix ')
17 y=[2.473 6.722 18.274 49.673 135.026]; // Enter y
    values (Independent Variables)
18 disp([y]);
19 n=length(x); // Calculate number of data enter in x
20 Y=log(y); // Calculating Y Value
21 X=x;
22 X2=X.*X; // Calculating X*X Value ( .* indicates
    respective value of x is multiplied with
    respective x value)
23 XY=X.*Y; // Calculating X*Y Value
24 a0=(sum(Y)*sum(X2)-sum(X)*sum(XY))/(n*sum(X2)-(sum(X)
    )^2); // Calculating coefficient a0
25 a1=((n*sum(XY)-sum(X)*sum(Y))/(n*sum(X2)-(sum(X))^2)
    ); // Calculating coefficient a1
26 a=exp(a0); // Finding the value of a
27 b=a1; // Finding the value of a
28 printf( '\n y=%f*e^%f*x ', a, b); // Displaying y=ae^b

```
