Name: Yash Sarang
A.Y.: 2020-2021
Roll no.: 47
Division: D1AD
SCI-LAB PRACTICAL 1: MODIFIED EULER'S METHOD

INPUT:

```
clc;
deff('[d]=f(x,y)','d=y+(x*x)');
x0=input("Enter initial value of x0=")
y0=input("Enter the value of y0=")
h=input("Enter the value of h=")
xn=input("Enter the final value of xn=")
n=input("Enter number of iterations =");
for i=1:n;
   disp('Step =');
   disp(i);
   x(i)=x0+h;
   y(i)=y0+h*(f(x0,y0));
   disp('At x =');
   disp(x(i));
   disp('Euler solution y=',y(i));
   disp("Modified Solution =");
   for j=1:5;
      y(j)=y0+h/2*(f(x0,y0)+f(x(i),y(i)));
      disp(y(j))
      y(i)=y(j);
   end

   if x(i)==xn then
      break;
   else x0=x(i);
      y0=y(i);
      disp('_____')
   end
end
```

OUTPUT:

```
Enter initial value of x0= 0
```

Enter the value of y0= 1

Enter the value of h= 0.05

Enter the final value of xn= 0.1

Enter number of iterations = 2

"Step ="

1.

"At x ="

0.05

"Euler solution y="

1.05

"Modified Solution ="

1.0513125

1.0513453

1.0513461

1.0513462

1.0513462

"——"

"Step ="

2.

"At x ="

0.1

"Euler solution y="

1.1040385

"Modified Solution ="

1.1055433

1.1055809

1.1055818

1.1055819

1.1055819

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SCI-LAB PRACTICAL 2: RUNGE KUTTA METHOD OF FOURTH ORDER

INPUT:

```
clc;
disp('By Runge Kutta fourth order Method')
deff('df=f(x,y)','df=y+(x*x)');
x0=input("Enter the initial value of x0= ")
y0=input("Enter the value of y0= ")
h=input("Enter the value of h= ")
xn=input("Enter the Final value of xn= ")
n=input("Number of Iterations= ")
x=[x0:h:xn];
x(1)=x0;
y(1)=y0;
j=1
for i=1:n;
   disp('Step =',j);
   k1=h*f(x(i),y(i));
   k2=h*f(x(i)+(h/2),y(i)+(k1/2));
   k3=h*f(x(i)+(h/2),y(i)+(k2/2));
   k4=h*f(x(i)+h,y(i)+k3);
   k=(1/6)*(k1+2*k2+2*k3+k4);
   disp('k1=',k1);
   disp('k2=',k2);
   disp('k3=',k3);
   disp('k4=',k4);
   disp('k=', k);
   y(i+1)=y(i)+k
   x(i+1)=x(i)+h
   disp('at x=',x(i+1));
   disp('y=',y(i+1));
   disp('_____')
   j=j+1
end
```

OUTPUT:

"By Runge Kutta fourth order Method"

Enter the initial value of x0= 0

Enter the value of y0= 1

Enter the value of h= 0.05

Enter the Final value of xn= 0.1

Number of Iterations= 2

"Step ="

1.

"k1="

0.05

"k2="

0.0512813

"k3="

0.0513133

"k4="

0.0526907

"k="

0.0513133

"at x="

0.05

"y="

1.0513133

"——"

"Step ="

2.

"k1="

0.0526907

"k2="

0.0541642

"k3="

0.0542010

"k4="

0.0557757

"k="

0.0541995

"at x="

0.1

"y="

1.1055128

"——"

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SCI-LAB PRACTICAL 3: SIMPSON'S 1/3RD METHOD

INPUT:

```
clc;
deff('y=f(x)','y=(5/x)')
a=input("x0= ")
b=input("xn=")
n=input("n= ")
h=(b-a)/n;
disp('h=', h);
add1=0
add2=0
add3=0
for i = 0 : n
   x=a+i*h
   y=f(x)
   disp('x=', x, 'y=', y);
   if (1==0)|(i==n) then
      add1=add1+y
   else if(modulo(i,2)==0) then
         add2=add2+y
   else
      add3=add3+y
   end
end
end
disp('Total coordinates of y =',n+1);
disp('Sum of Extreme coordinates X=',add1);
disp('Sum of Even coordinates E=',add2);
disp('Sum of Odd coordinates O=',add3);
I=(h/3)*(add1+2*add2+4*add3);
disp("Integration by Simpson 1/3rd Rule is I=",I);
```

OUTPUT:

```
x0= 1
```

xn= 2

n= 10

"h="

0.1

"x="

1.

"y="

5.

"x="

1.1

"y="

4.5454545

"x="

1.2

"y="

4.1666667

"x="

1.3

"y="

3.8461538

"x="

1.4

"y="

3.5714286

"x="

1.5

"y="

3.3333333

"x="

1.6

"y="

3.125

"x="

1.7000000

"y="

2.9411765

"x="

1.8

"y="

2.7777778

"x="

1.9

"y="

2.6315789

"x="

2.

"y="

2.5

"Total coordinates of y ="

11.

"Sum of Extreme coordinates X="

2.5

"Sum of Even coordinates E="

18.640873

"Sum of Odd coordinates O="

17.297697

"Integration by Simpson 1/3rd Rule is I="

3.6324178

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SCI-LAB PRACTICAL 4: SIMPSON'S 3/8RD METHOD

INPUT:

```
clc;
deff('y=f(x)','y=4+(x*x)')
a=input("x0=")
b=input("xn=")
n=input("n=")
h=(b-a)/n
disp('h=', h);
add1=0
add2=0
add3=0
for i = 0 : n
   x=a+i*h
   y=f(x)
   disp('x=', x, 'y=', y);
   if (i==0)|(i==n) then
      add1=add1+y
      else if (modulo(i,3)==0) then
      add2=add2+y
   else
      add3=add3+y
   end
end
end
disp('Total coordinates of y =',n+1);
disp('Sum of Extreme coordinates X=',add1);
disp('Sum of Multiples of three coordinates T=',add2);
disp('Sum of Remaining coordinates R=',add3);
I=((3*h)/8)*(add1+2*add2+3*add3)
disp("Integration by Simpson 3/8th Rule I=",I);
```

OUTPUT:

```
x0= 7
```

xn= 7.8

n= 12

"h="

0.0666667

"x="

7.

"y="

53.

"x="

7.0666667

"y="

53.937778

"x="

7.1333333

"y="

54.884444

"x="

7.2

"y="

55.84

"x="

7.2666667

"y="

56.804444

"x="

7.3333333

"y="

57.777778

"x="

7.4

"y="

58.760000

"x="

7.4666667

"y="

59.751111

"x="

7.5333333

"y="

60.751111

"x="

7.6

"y="

61.76

"x="

7.6666667

"y="

62.777778

"x="

7.7333333

"y="

63.804444

"x="

7.8

"y="

64.84

"Total coordinates of y ="

13.

"Sum of Extreme coordinates X="

117.84

"Sum of Multiples of three coordinates T="

176.36

"Sum of Remaining coordinates R="

470.48889

"Integration by Simpson 3/8th Rule I="

47.050667