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 ="

"Euler solution y="

1.1040385

"Modified Solution ="

1.1055433

1.1055809

1.1055818

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;
i=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="

```
"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= ")

OUTPUT:

else

end

end end

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

> > add3=add3+y

else if(modulo(i,2)==0) then add2=add2+y

disp('Total coordinates of y = ',n+1);

I=(h/3)*(add1+2*add2+4*add3);

disp('Sum of Extreme coordinates X=',add1); disp('Sum of Even coordinates E=',add2); disp('Sum of Odd coordinates O=',add3);

disp("Integration by Simpson 1/3rd Rule is I=",I);

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="

"x="

1.4

"y="

3.5714286

"x="

1.5

"y="

3.3333333

"x="

1.6

"y="

3.125

"x="

1.7000000

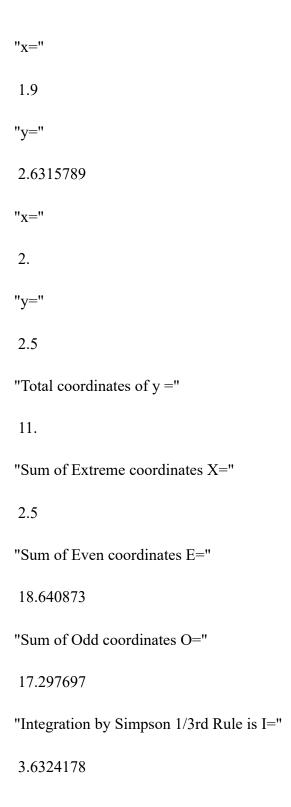
"y="

2.9411765

"x="

1.8

"v='



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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="

"x="

7.2666667

"y="

56.804444

"x="

7.3333333

"y="

57.777778

"x="

7.4

"y="

58.760000

"x="

7.4666667

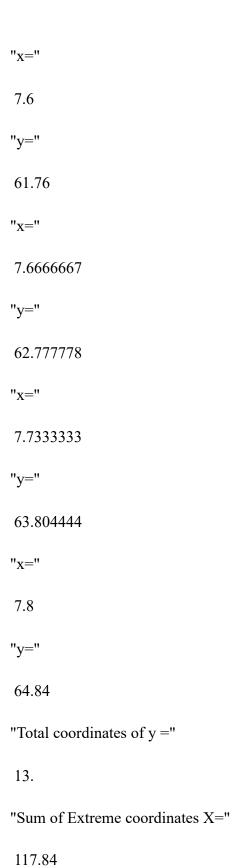
"y="

59.751111

"x="

7.5333333

"y="



"Sum of Multiples of three coordinates T="

176.36

"Sum of Remaining coordinates R="

470.48889

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