NAME: MAYUR PIMPUDE **CLASS:**D1AD **ROLL NO.:**43 **AY:**2020-21

SCI-LAB PRACTICAL 1: MODIFIED EULER'S METHOD

QUESTION:dx/dy = y + x^2 , y(0)=1 for x=0.1 and h=0.05

INPUT:

```
clc;
deff('[d]=f(x,y)','d=x^2+y');
   x0=input("enter x0 value:")
   y0=input("enter y0 value:")
   h=input("enter value of h:")
   xn=input("enter final value of x:")
   n=input("enter number of iteration:")
   for i=1:n;
      disp('step=',(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 y=")
      for j=1:7;
         y(j)=y0+0.5*h*(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);
      y(0)=y(i);
     end
   end
```

Output:

```
enter x0 value:0

enter y0 value:1

enter value of h:0.05

enter final value of x:0.1

enter number of iteration:5
```

"step="

1.

"at x="

0.05

"euler solution y="

1.05

"modified solution y="

1.0513125

1.0513453

1.0513461

1.0513462

1.0513462

1.0513462

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SCI-LAB PRACTICAL 2: Runge kutta method of order four

QUESTION:dx/dy = y + x^2 , y(0)=1 for x=0.1 and h=0.05

INPUT:

```
clc;
deff('g=f(x,y)','g=y+x^2');
xo=input("Enter initial value of xo: ")
yo=input("Enter the value of yo: ")
h=input("Enter value of h: ")
xn=input("Enter Final value of xn: ")
n=(xn-xo)/h;
disp('number of iterations:',n);
for i=1:n
   disp('step=',i)
   k1=h*f(xo,yo);
   k2=h*f(xo+(h/2),yo+(k1/2));
   k3=h*f(xo+(h/2),yo+(k2/2));
   k4=h*f(xo+h,yo+k3);
   y1=yo+(1/6)*(k1+2*k2+2*k3+k4);
   xo=xo+h;
   disp('k1=',k1)
   disp('k2=',k2)
   disp('k3=',k3)
   disp('k4=',k4)
   disp("x=",xo);disp("y=",y1);
   yo=y1
end
```

OUTPUT:

Enter initial value of xo: 0

Enter the value of yo: 1

Enter value of h: 0.05

Enter Final value of xn: 0.1

"number of iterations:"

2.

"step="

1.

"k1="

0.05

"k2="

0.0512813

"k3="

0.0513133

"k4="

0.0526907

"x="

0.05

"y="

1.0513133

"step="

2.

"k1="

0.0526907

"k2="

0.0541642

"k3="

0.0542010

"k4="

0.0557757

"x="

0.1

"y="

1.1055128

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SCI-LAB PRACTICAL 3 : Simpson's 1/3rd Method

QUESTION: ∫ 5/x dx by dividing intervals into 10 subintervals.

INPUT:

```
clc;
funcprot(0);
function ans=simpson(a, b, n, g)
disp('lower limit is=',a);
disp('upper limit is=',b);
disp('number od interval=',n);
   h=(b-a)/n;
   sum=0;
   for i=1:n-1
      x=a+i*h;
      if modulo(i,2)==0
         sum=sum+2*g(x);
      else
         sum=sum+4*g(x);
      end
   end
   ans=(h/3)*(g(a)+g(b)+sum);
endfunction
```

OUTPUT:

```
deff('y=f(x)','y=5/x')

--> simpson(1,2,10,f)

 "lower limit is="

  1.

 "upper limit is="

  2.

 "number of interval="
```

10.

ans =

3.4657512

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SCI-LAB PRACTICAL 4 : Simpson's 3/8rd Method

QUESTION: ∫(4+x^2) by dividing intervals into 12 subintervals.

INPUT:

```
deff('y=f(x)','y=x^2+4');
a=input("Enter Lower Limit: ");
b=input("Enter Upper Limit: ");
n=input("Enter number of sum intervals: ");
h=(b-a)/n;
add1=0;
add2=0;
add3=0;
for i=0:n;
   x=a+i*h;
   y=f(x);
   disp([x 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
I=((3*h)/8)*(add1+2*add2+3*add3);
disp(I,"Integration by Simpsons (3/8)th Rule is:");
```

OUTPUT:

Enter Lower Limit: 7

Enter Upper Limit: 7.8

Enter number of sum intervals: 12

7. 53.

7.0666667 53.937778

7.1333333 54.884444

7.2 55.84

7.2666667 56.804444

7.3333333 57.777778

7.4 58.76

7.4666667 59.751111

7.5333333 60.751111

7.6 61.76

7.6666667 62.777778

7.7333333 63.804444

7.8 64.84

"Integration by Simpsons (3/8)th Rule is:"

47.050667