**ASSIGNMENT NO:-3**

**PROGRAM NO:-1**

%Program: Euler’s Method (Iterative)

%Name: Vedant Patil

%Roll No.: 2196099

%I/P: fun,x1.y1.xn.h

function[]=VAP\_Euler(fun,x0,y1,xn,h)

while x0<xn

y1=y1+h\*feval(fun,x0,y1);

x0=x0+h;

end

y1

% VAP\_Euler(@(x,y) x+2\*y,1,1,1.4,0.1)

%

% y1 =

%

% 2.6788

%

% [x,y]=ode23(@(x,y) x+2.\*y,[1:0.1:1.4],1)

%

% x =

%

% 1.0000

% 1.1000

% 1.2000

% 1.3000

% 1.4000

%

%

% y =

%

% 1.0000

% 1.3374

% 1.7607

% 2.2887

% 2.9446

**ASSIGNMENT NO:-3**

**PROGRAM NO:-2**

%Program: Runge-Kutta 2ND Order

%Name: Vedant Patil

%Roll No.: 2196099

%I/P: fun,x0,y0,xn,h

function[]=VAP\_RK2(fun,x0,y0,xn,h)

n=(xn-x0)/h;

for i=1:n

k1=h\*feval(fun,x0,y0);

k2=h\*feval(fun,x0+h,y0+k1);

k=1/2\*(k1+k2);

yn=y0+k;

x0=x0+h;

y0=yn;

end

yn

% VAP\_RK2(@(x,y) x^2+y,0,1,0.02,0.02)

%

% yn =

%

% 1.0202

%

% [x,y]=ode23(@(x,y) y+x.^2,[0:0.02:0.02],1)

%

% x =

%

% 0

% 0.0020

% 0.0040

% 0.0060

% 0.0080

% 0.0100

% 0.0120

% 0.0140

% 0.0160

% 0.0180

% 0.0200

%

%

% y =

%

% 1.0000

% 1.0020

% 1.0040

% 1.0060

% 1.0080

% 1.0101

% 1.0121

% 1.0141

% 1.0161

% 1.0182

% 1.0202

**ASSIGNMENT NO:-3**

**PROGRAM NO:-3**

%program: Runge-Kutta 4th Order Method

%Name: Vedant Patil

%Roll No.: 2196099

%I/P: fun,x0,y0,xn,h

function[]=VAP\_RUNKUT4(fun,x0,y0,xn,h)

n=(xn-x0)/h;

for i=1:n

k1=h\*feval(fun,x0,y0);

k2=h\*feval(fun,x0+h/2,y0+k1/2);

k3=h\*feval(fun,x0+h/2,y0+k2/2);

k4=h\*feval(fun,x0+h,y0+k3);

k=1/6\*(k1+2\*k2+2\*k3+k4);

yn=y0+k;

x0=x0+h;

y0=yn;

end

yn

% VAP\_RUNKUT4(@(x,y) 1+y^2,0,0,0.2,0.2)

%

% yn =

%

% 0.2027

%

% [x,y]=ode23(@(x,y) 1+y.^2,[0:0.2:0.2],0)

%

% x =

%

% 0

% 0.0001

% 0.0005

% 0.0025

% 0.0125

% 0.0325

% 0.0525

% 0.0725

% 0.0925

% 0.1125

% 0.1325

% 0.1525

% 0.1725

% 0.1925

% 0.2000

%

%

% y =

%

% 0

% 0.0001

% 0.0005

% 0.0025

% 0.0125

% 0.0325

% 0.0525

% 0.0726

% 0.0927

% 0.1130

% 0.1333

% 0.1537

% 0.1742

% 0.1949

% 0.2027

**ASSIGNMENT NO:-3**

**PROGRAM NO:-4**

%Program: Parabolic Explicit Solution

%Name: Vedant Patil

%Roll No.: 2196099

%I/P: fun,x0,xn,t0,tn,h,k,u1,u2

function[]=VAP\_PDE(fun,x0,xn,t0,tn,h,k,u1,u2)

n=(xn-x0)/h;

for i=1:1:n+1

x1(i)=x0+h\*(i-1);

end

m=(tn-t0)/k;

for i=1:1:m+1

t1(i)=t0+k\*(i-1);

end

for r=1:m+1

x(r,1)=u1;

x(r,n+1)=u2;

end

for c=2:1:n

x(1,c)=feval(fun,x0+(h\*(c-1)));

end

v=k/(h\*h);

for r=2:1:m+1

for c=2:1:n

x(r,c)=v\*(x(r-1,c-1)+(1-2\*v)\*x(r-1,c)+v\*x(r-1,c+1));

end

end

for r=m+1:-1:1

for c=1:1:n+1

fprintf('\t%f',x(r,c));

end

fprintf('\n');

end

% VAP\_PDE( @ (x)2\*x+1,0,0.5,0,0.03,0.1,0.01,1,1)

% 1.000000 1.200000 0.400000 2.600000 -0.200000 1.000000

% 1.000000 1.200000 1.400000 0.600000 1.800000 1.000000

% 1.000000 1.200000 1.400000 1.600000 0.800000 1.000000

% 1.000000 1.200000 1.400000 1.600000 1.800000 1.000000