Lab 1

Q2

clear; clc;

N = 81; c=1;

x = linspace(0,3,N+1);

dx= 0.025;

dt=0.02;

tf=30\*dt;

M=tf/dt;

%++++++++++++++++++++++++++++++++++++++++++++++++

u = ones(N+1,1);

for i=1:N+1

if x(i)>0.5 && x(i)<1

u(i)=2;

end

end

%++++++++++++++++++++++++++++++++++++++++++++++++

for n=1:M

un=u;

for i=2:N+1

u(i)=un(i)-(c\*dt/dx)\*(un(i)-un(i-1));

end

u(1)=1;

plot(x,u,'-o')

pause(0.2)

end

Q3

clear; clc;

N = 81; c=1;

x = linspace(0,2,N+1);

dx= 0.025;

dt=0.01;

tf=30\*dt;

M=tf/dt;

%++++++++++++++++++++++++++++++++++++++++++++++++

u = ones(N+1,1);

for i=1:N+1

if x(i)>0.5 && x(i)<1

u(i)=2;

end

end

%++++++++++++++++++++++++++++++++++++++++++++++++

for n=1:M

un=u;

for i=2:N

u(i)=un(i)-(c\*dt/(2\*dx))\*(un(i+1)-un(i-1)) ;

end

u(N+1)=un(N+1)-(c\*dt/dx)\*(un(N+1)-un(N));

u(1)=1;

plot(x,u,'-o')

pause(0.2)

end

Q4

clear; clc;

N = 41;

x = linspace(0,2,N+1);

u=sin(pi\*x);

dx= x(2)-x(1);

dt=dx

tf=30\*dt;

M=tf/dt;

%++++++++++++++++++++++++++++++++++++++++++++++++

for n=1:M

un=u;

for i=2:N+1

u(i)=un(i)-(un(i)\*dt/dx)\*(un(i)-un(i-1));

end

u(1)=1;

plot(x,u,'-o')

pause(0.2)

end