INDIAN INSTITUTE OF INFORMATION TECHNOLOGY

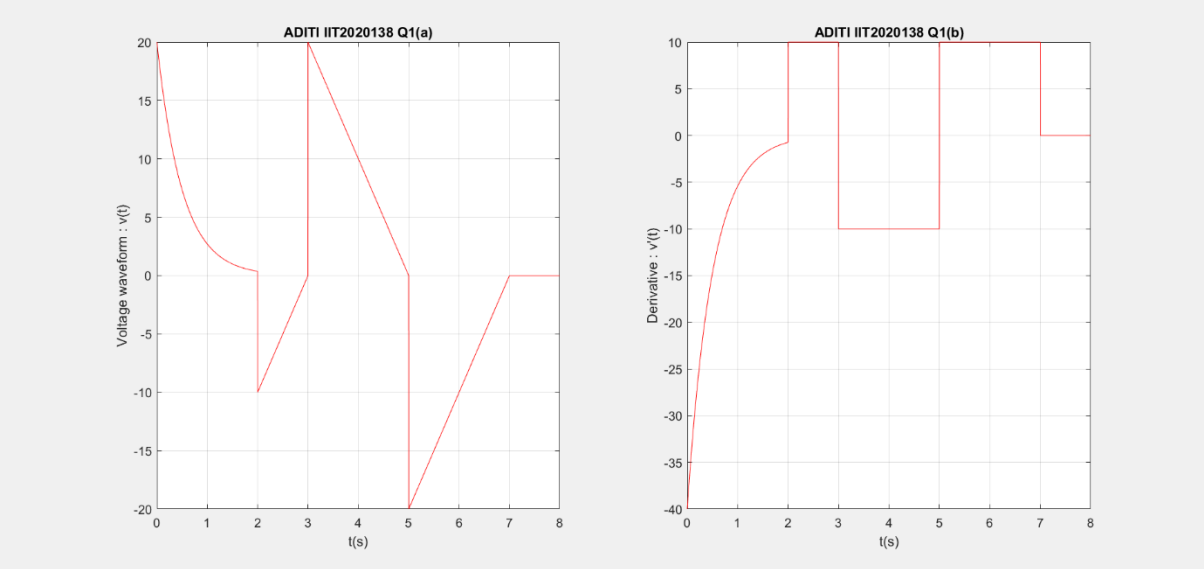
POC MATLAB ASSIGNMENT

ADITI

IIT2020138

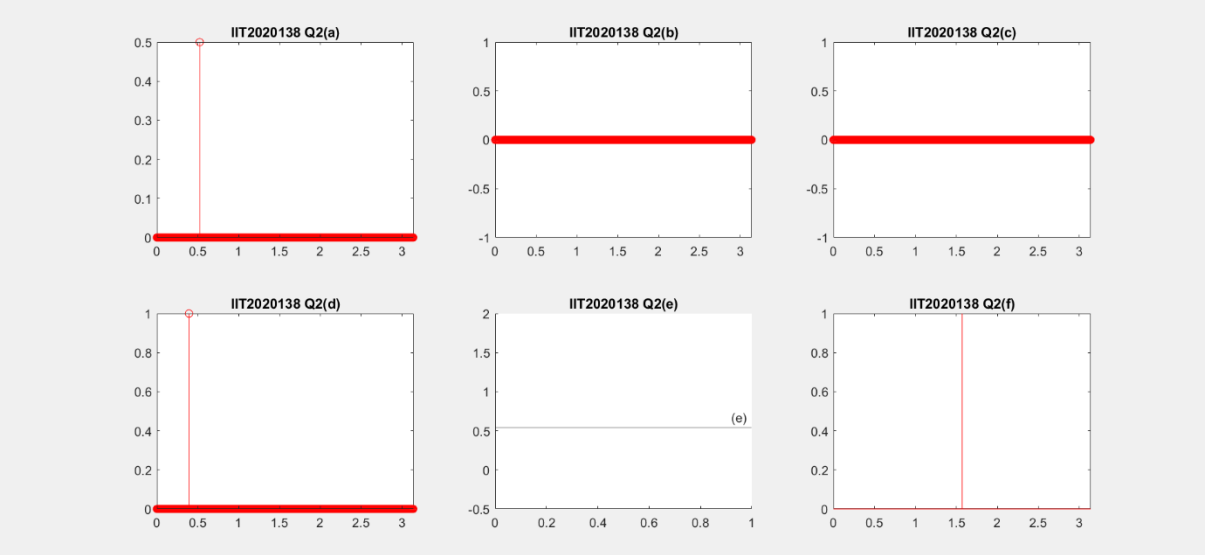
Q1.

```
% ADITI - IIT2020138 - Q1

t=0:0.001:8;

uv1=t>=0;
uv2=t>=2;
uv3=t>=3;
uv5=t>=5;
uv7=t>=7;
v=20*exp(-2*t).*(uv1-uv2)+(10*t-30).*(uv2-uv3)+(50-10*t).*(uv3-uv5)+(10*t-
70).*(uv5-uv7);
subplot(1,2,1);
plot(t,v,'r');
grid on;
title("ADITI IIT2020138 Q1(a)");
xlabel("t(s)");
ylabel("Voltage waveform : v(t)");
ud1=t>=0;
ud2=t>=2;
ud3=t>=3;
ud5=t>=5;
ud7=t>=7;
vd=-40*exp(-2*t).*(ud1-ud2)+10*(ud2-ud3)-10*(ud3-ud5)+10*(ud5-ud7);
subplot(1,2,2);
plot(t,vd,'r');
grid on;
title("ADITI IIT2020138 Q1(b)");
xlabel("t(s)");
ylabel("Derivative : v'(t)");
```



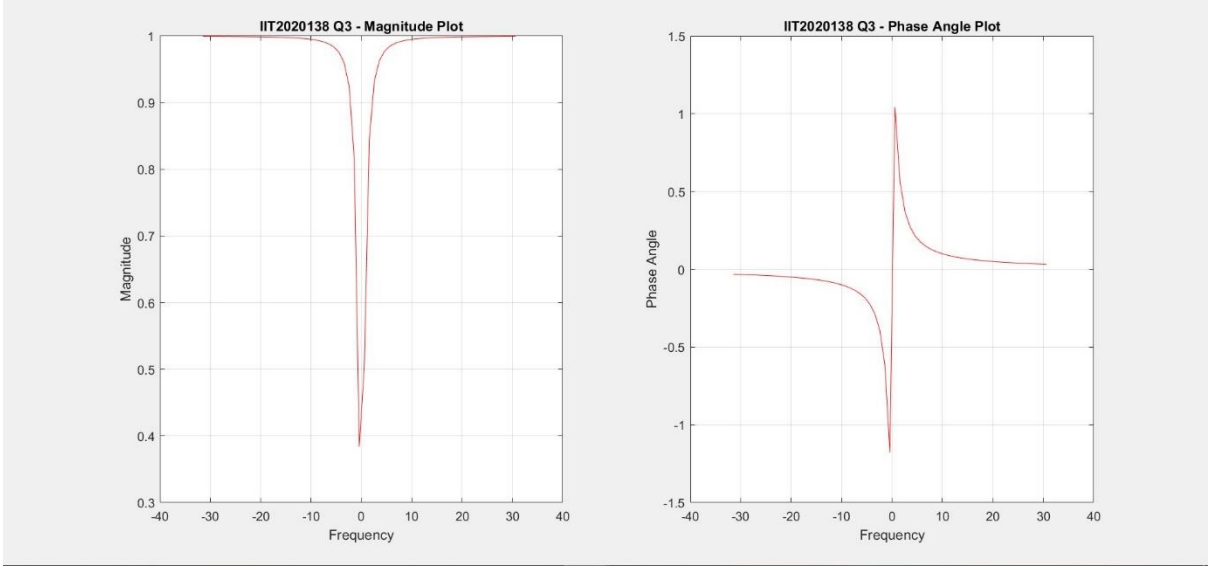
Q2.

```
% ADITI - IIT2020138 - Q2

x = 0:(pi/24576):pi;

y1 = sin(x).*(dirac(x-(pi/6)));
idx = y1 == Inf;
y1(idx) = 1/2;
subplot(2,3,1);
stem(x,y1,'r');
title('IIT2020138 Q2(a)');

y2 = cos(2*x).*dirac(x-(pi/4));
idx = y2 == Inf;
y2(idx) = 0;
subplot(2,3,2);
stem(x,y2,'r');
title('IIT2020138 Q2(b)');

y3 = cos(x).^2.*dirac(x-(pi/2));
idx = y3 == Inf;
y3(idx) = 0;
subplot(2,3,3);
stem(x,y3,'r');
title('IIT2020138 Q2(c)');

y4 = tan(2*x).*dirac(x-(pi/8));
idx = y4 == Inf;
y4(idx) = 1;
subplot(2,3,4);
stem(x,y4,'r');
title('IIT2020138 Q2(d)');

y5 = (x.^2).*exp(-x).*dirac(x-2);
y5 = 4.*exp(-2);
subplot(2,3,5);
yline(y5,'-','(e)');
title('IIT2020138 Q2(e)');

y6 = sin(x).^2.*dirac(x-(pi/2));
idx = y6 == Inf;
y6(idx) = 1;
subplot(2,3,6);
plot(x,y6,'r');
title('IIT2020138 Q2(f)');
```



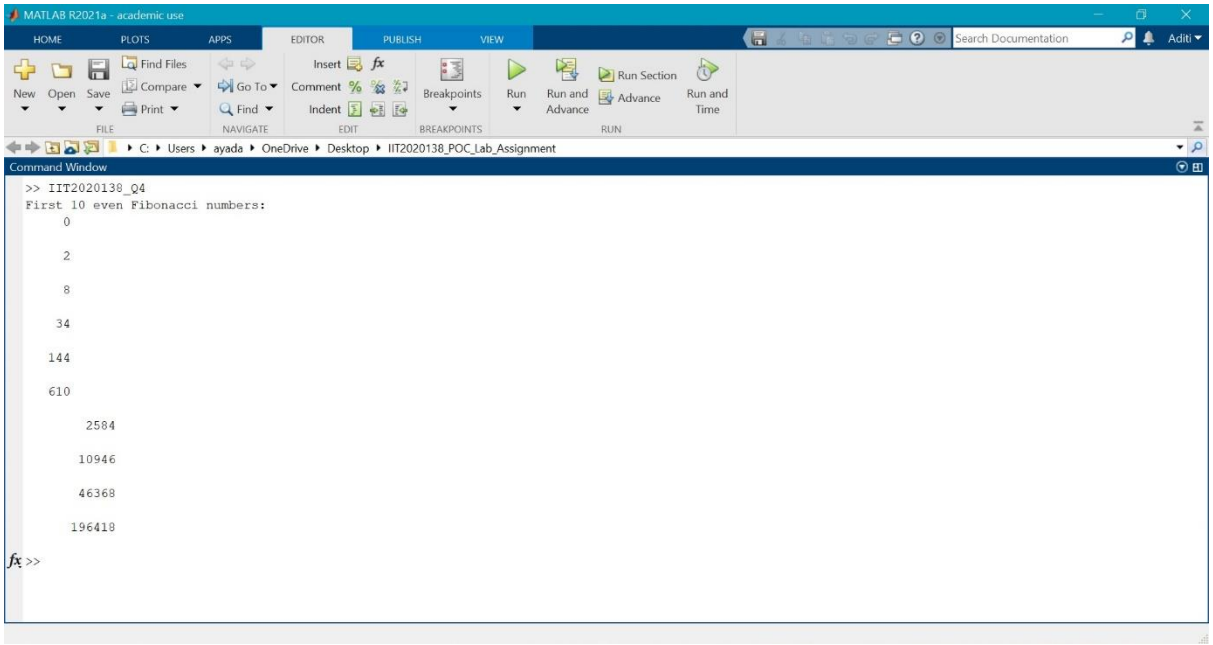
Q3.

```
% ADITI - IIT2020138 - Q3

syms w
X = 1j*w/(1 + 1j*w);
w_val = -10*pi:10*pi;
X_val = (double(subs(X,w,w_val)));

subplot(2,1,1);              % Magnitude Plot
plot(w_val, abs(X_val), 'r'), title('IIT2020138 Q3 - Magnitude
Plot');
xlabel('Frequency');
ylabel('Magnitude');
grid on;

subplot(2,1,2);              % Phase Angle Plot
plot(w_val,angle(X_val), 'r'), title('IIT2020138 Q3 - Phase Angle
Plot');
xlabel('Frequency');
ylabel('Phase Angle');
grid on;
```



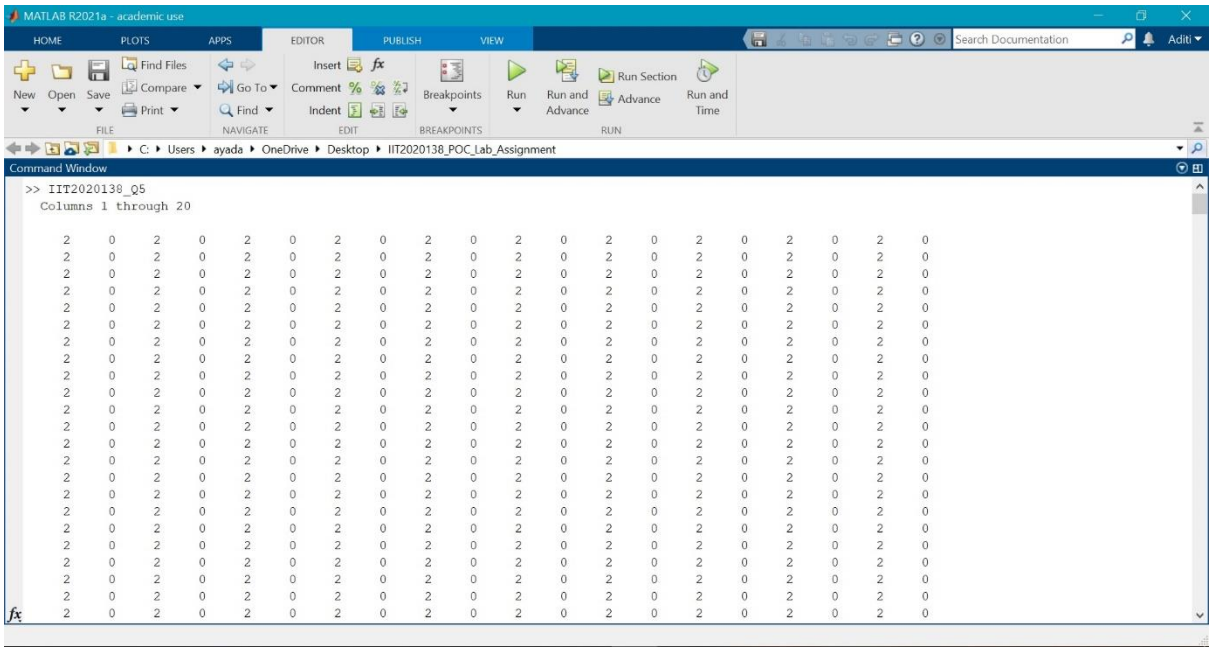
Q4.

```
% ADITI - IIT2020138 - Q4

A(1)=0;
A(2)=1;
t=0;
i=3;
fprintf('First 10 even Fibonacci numbers:\n');
disp(A(1));

while(1)
  A(i) = A(i-1) + A(i-2);
  if(rem(A(i),2)==0)
    disp(A(i));
    t = t+1;
  end
  if(t >= 9)
    break;
  end
  i = i+1;
end
```



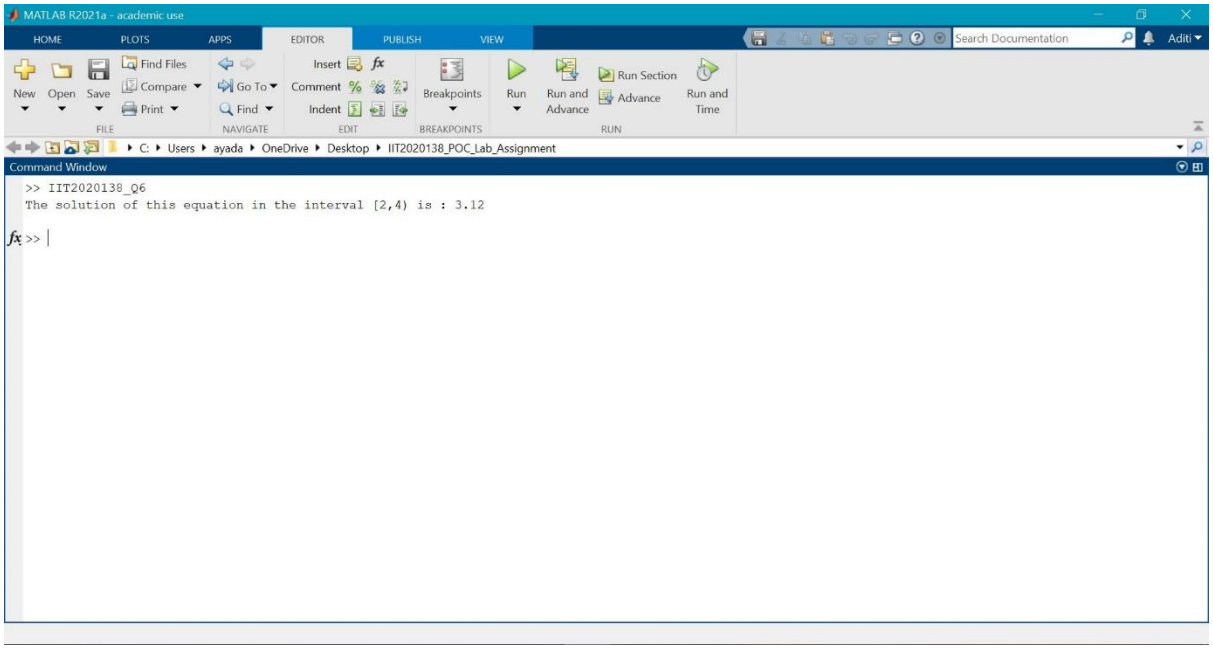
Q5.

```
% ADITI - IIT2020138 - Q5

A = zeros(100,100);                 % A 100 x 100 matrix with all the
entries equal to zero.
for i=1:100
    for j=1:100
        if mod(j,2)~=0              % To store 2 in even columns.
            A(i,j)=2;
        end
    end
end
disp(A);
```



Q6.

```
% ADITI - IIT2020138 - Q6

syms x;
F1 = sin(x);
F2 = (x-2).^3;
Eqn = 0.5.*F2 - 40.*F1==0;
Sol = vpasolve(Eqn, x, [2 4]);
fprintf('The solution of this equation in the interval [2,4) is :
');
disp(vpa(Sol,3));
```



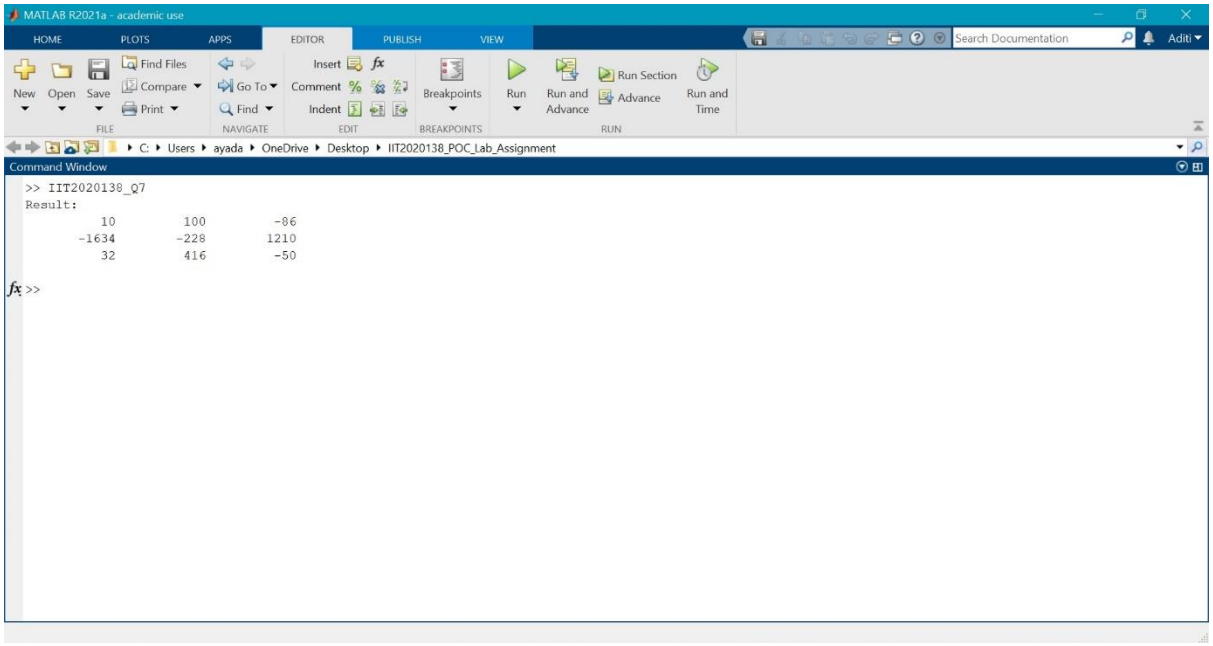
Solution:

>> IIT2020138_Q6

The solution of this equation in the interval [2,4) is : 3.12

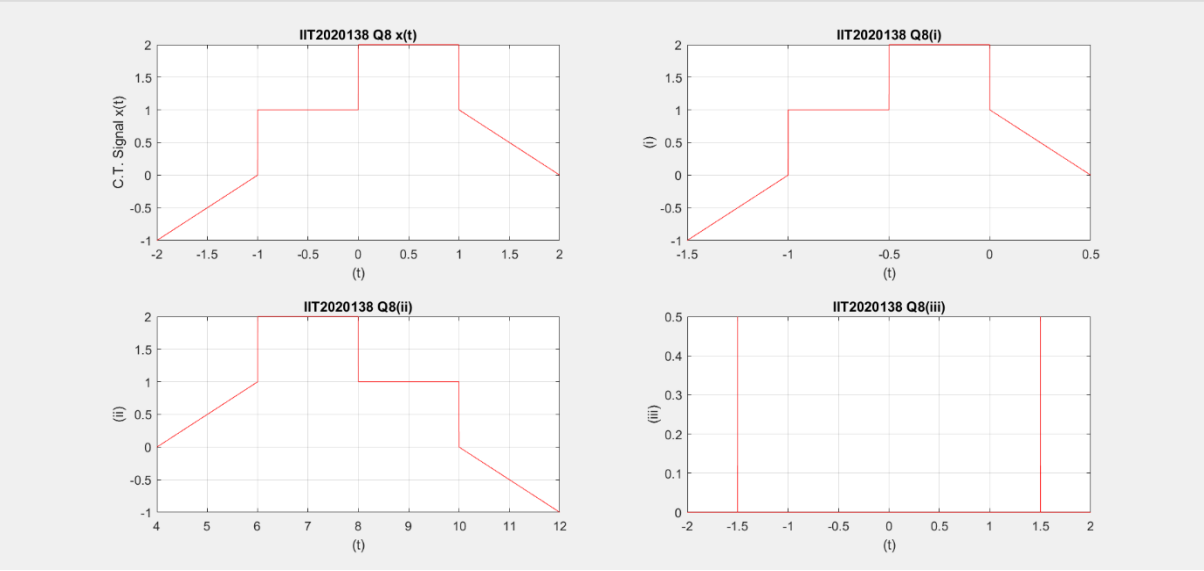
Q7.

```
% ADITI - IIT2020138 - Q7

A = [10 -7 6 -9 ; 0 -1 10 7 ; 7 9 4 9];
B = [4 -2 5 -9 ; 6 4 -9 -8 ; 5 -6 -4 7];
C = [5 4 -7 -3 ; 6 4 0 2 ; -4 -6 10 -5];
D = (6*A-8*B)*C';
fprintf('Result:\n');
disp(D);
```



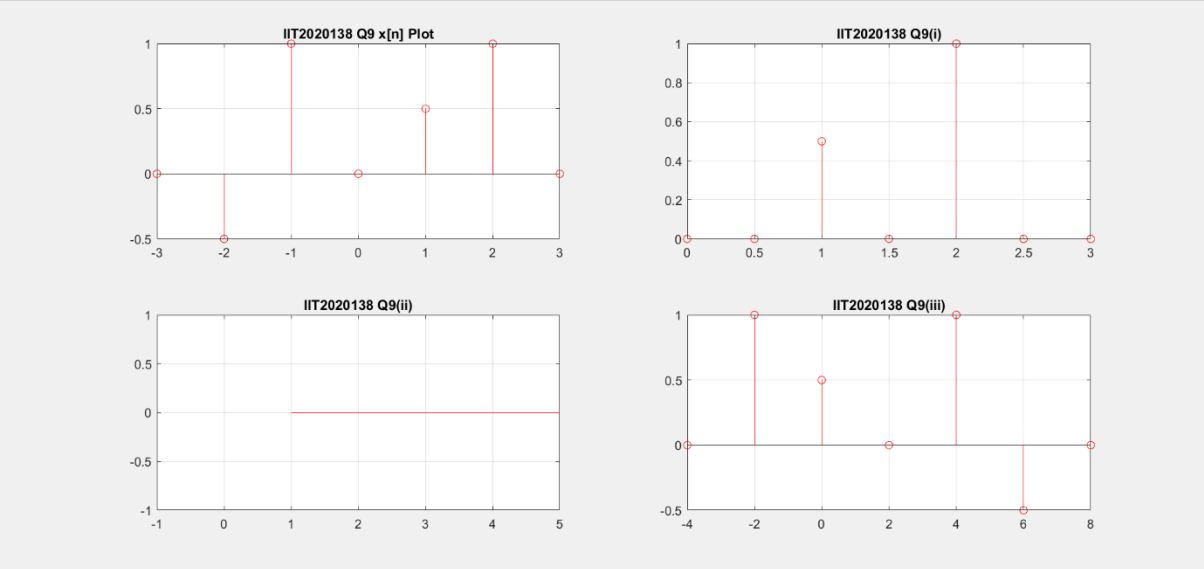
Q8.

```
% ADITI - IIT2020138 - Q8

t=-2:0.0005:2;
d1=t>=-2;
d2=t>=-1;
d3=t>=0;
d4=t>=1;
d5=t>=2;

u1=t+1;
u2=2-t;
xt=u1.*(d1-d2)+(d2-d3)+2*(d3-d4)+u2.*(d4-d5);

subplot(2,2,1);
plot(t,xt,'r');
grid on;
title('IIT2020138 Q8 x(t)');
xlabel('(t)');
ylabel('C.T. Signal x(t)');

subplot(2,2,2);
plot((t-1)/2,xt,'r');
grid on;
title('IIT2020138 Q8(i)');
xlabel('(t)');
ylabel('(i)');

subplot(2,2,3);
plot(2*(-t+4),xt,'r');
grid on;
title('IIT2020138 Q8(ii)');
xlabel('(t)');
ylabel('(ii)');

subplot(2,2,4);
yt = xt.*(dirac(t-3/2)-dirac(-t-3/2));
idx = yt == inf;
yt(idx) = 1/2;
plot(t,yt,'r');
grid on;
title('IIT2020138 Q8(iii)');
xlabel('(t)');
ylabel('(iii)');
```



Q9.

```
% ADITI - IIT2020138 - Q9

n = -3:1:3;
x = (-1/2*(n==-2)+(n==-1)+1/2*(n==1)+(n==2));

a = subplot(2,2,1);
stem(n,x,'r');
grid on;
title('IIT2020138 Q9 x[n] Plot');

b = subplot(2,2,2);
stem(3/2-1/2*n,x.*(floor(3/2-1/2*n)==3/2-n/2),'r');
grid on;
title('IIT2020138 Q9(i)');

c = subplot(2,2,3);
plot(n+2,x.*dirac(n+2),'r');
grid on;
title('IIT2020138 Q9(ii)');

d = subplot(2,2,4);
stem(2-2*n,x.*(floor(2-2*n)==2-2*n),'r');
grid on;
title('IIT2020138 Q9(iii)');
```



Q10.

```
% ADITI - IIT2020138 - Q10

t=0:0.05:20;                % Given in the question.
n=1:1:30;

F1 = exp(-0.2*t);
F2 = cos(8*pi*t/31);

a = subplot(2,2,1);         % Plot for Part(a).
plot(t, F1, 'r'), xlabel('Time'), title('IIT2020138 Q10(a)');
grid on;

b = subplot(2,2,2);         % Plot for Part(b).
plot(t, F1.*F2, 'r'), xlabel('Time'), title('IIT2020138 Q10(b)');
grid on;

F3 = exp(-0.2*n);
F4 = cos(8*pi*n/31);

c = subplot(2,2,3);         % Plot for Part(c).
c = stem(n, F3, 'r'), xlabel('n'), title('IIT2020138 Q10(c)');
grid on;

d = subplot(2,2,4);         % Plot for Part(d).
d = stem(n, F3.*F4, 'r'), xlabel('n'), title('IIT2020138 Q10(d)');
grid on;
```