Assignment – 2

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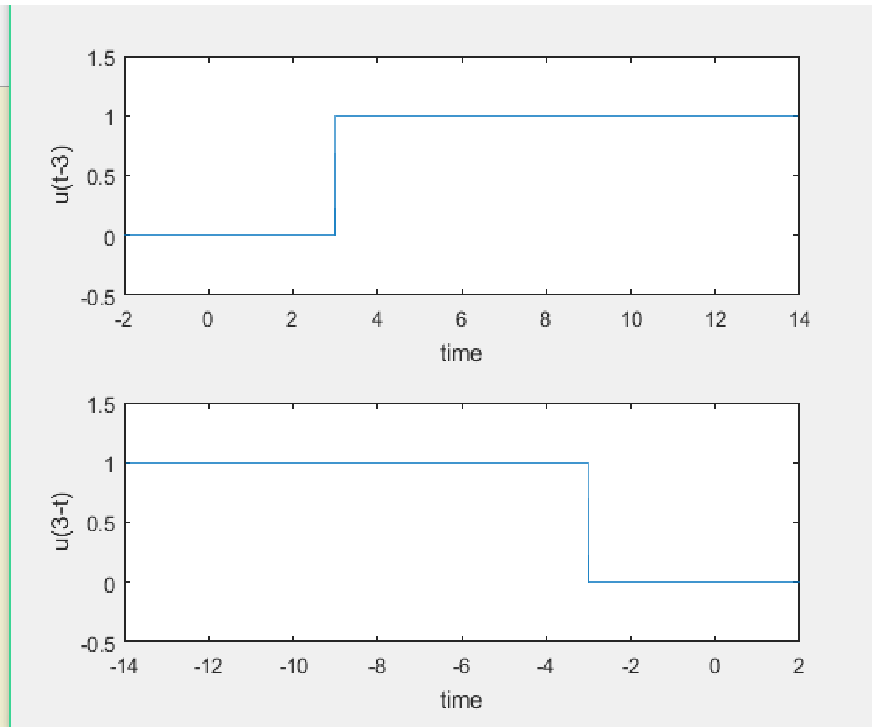
II. Signal Transformation

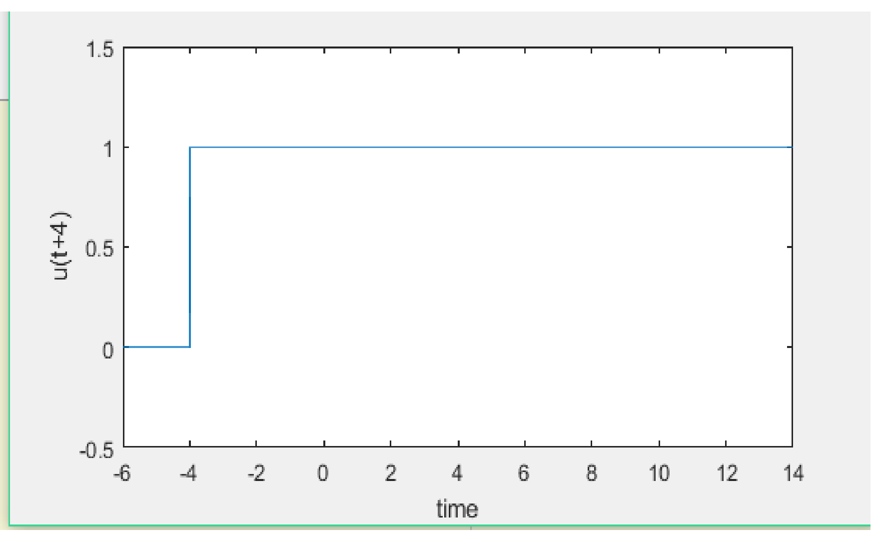
1. (a) $\boldsymbol{u(t-3)}$ ***and*** $\boldsymbol{u(3-t)}$

```
clc
clear all
close all
%%
%u(t)
Fs = 100;
 dt = 1/Fs;
   StartTime = -2;
   StopTime = 14;
   t = StartTime:dt:StopTime-dt;
   x = (t>3) ;
   figure;
   %u(t-3)
   subplot(211);
   plot(t,x);
   ylabel('u(t-3)');
   xlabel('time');
   ylim([-0.5 1.5]);
   %u(3-t)
   subplot(212);
   x = (t>3) ;
   plot(-t,x);
   ylabel('u(3-t)');
   xlabel('time');
   ylim([-0.5 1.5]);
```



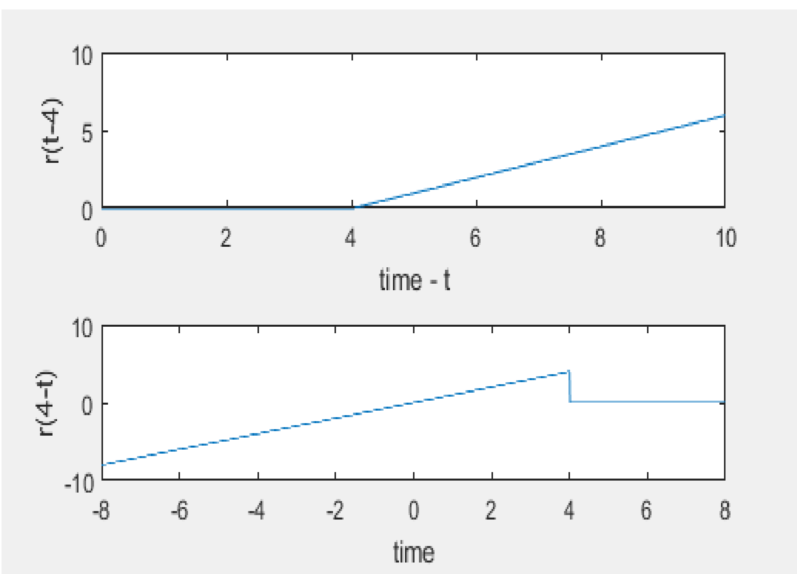
(b) $\boldsymbol{u(t+4)}$

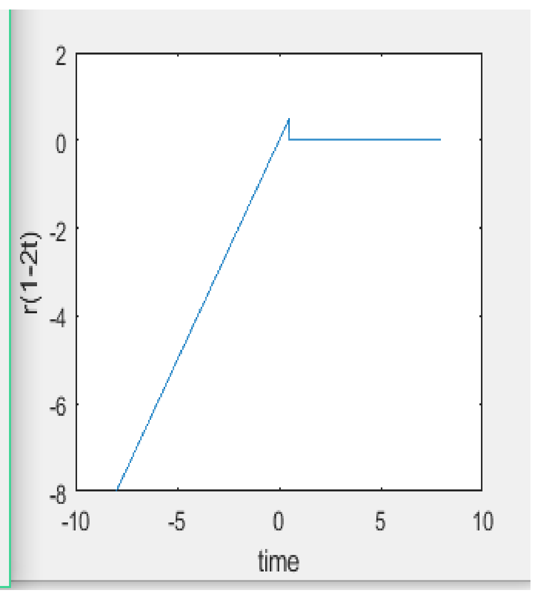
```
clc
clear all
close all
%%
Fs = 100;
 dt = 1/Fs;
   StartTime = -6;
   StopTime = 14;
   t = StartTime:dt:StopTime-dt;
   x = (t>-4) ;
   figure;
   %u(t+4)
   plot(t,x);
   ylabel('u(t+4)');
   xlabel('time');
   ylim([-0.5 1.5]);
```



2 . $(a) \quad \boldsymbol{r(t-4)} \quad \boldsymbol{and\, r(4-t)} \quad \boldsymbol{and} \quad \boldsymbol{r(1-2t)}$

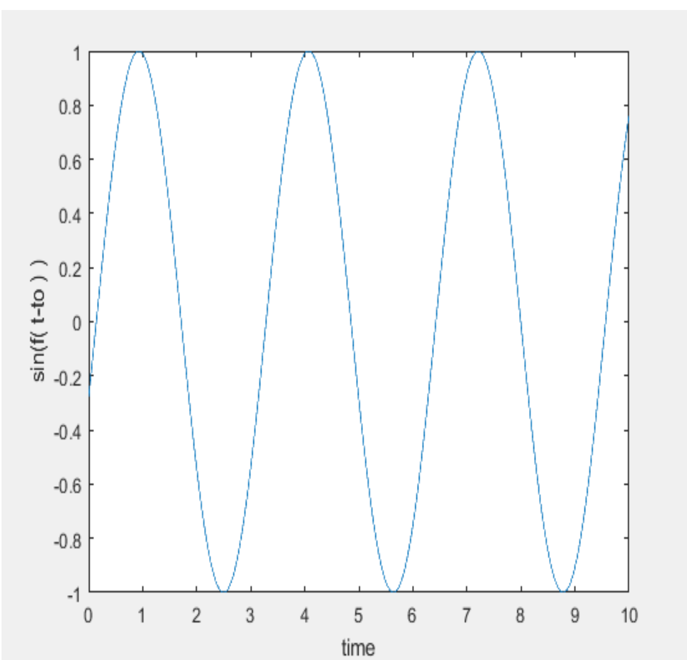
```
clc
clear all
close all
%%
to=4;
t=linspace(0,10);
y=zeros(1,length(t));
figure;
%r(t-4)
y(t>=to) = t(t>=0 & t<=6);
subplot(211);
plot(t,y);
xlabel('time - t');
ylabel('r(t-4)');
%r(4-t);
subplot(212);
t=(-8:0.01:8)';
z = (4-t)>=0;
r2=t.*z;
plot(t,r2);
xlabel('time');
ylabel('r(4-t)');
%r(1-2t)
figure;
z = (1-(2*t))>=0;
r2=t.*z;
plot(t,r2);
xlabel('time');
ylabel('r(1-2t)');
```

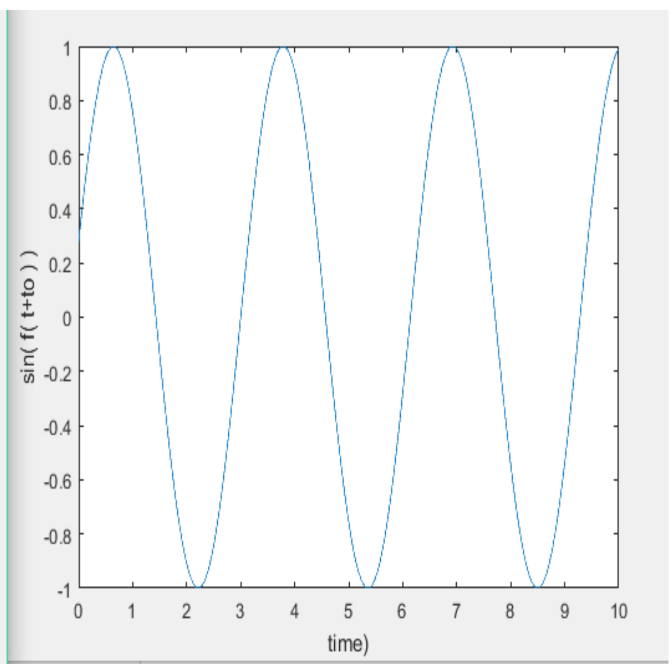




3 . $\sin\left(\Omega o(t - to)\right)$ *and* $\sin(\Omega o(t + to))$

```
clc
clear all
close all
%%
    Fs = 1000;
    dt = 1/Fs;
    to=3;%to
    omg=2
    t=0:0.001:10;
    %sin(omega*(t-to));
    figure;
    y = sin(omg*(t+to));
    plot(t,y);
    xlabel('time');
    ylabel('sin(f( t-to ) )');
    %sin(omega*(t+to));
    x = sin(omg*(t-to));
    figure;
    plot(t,x);
    xlabel('time)');
     ylabel('sin( f( t+to ) )');
```

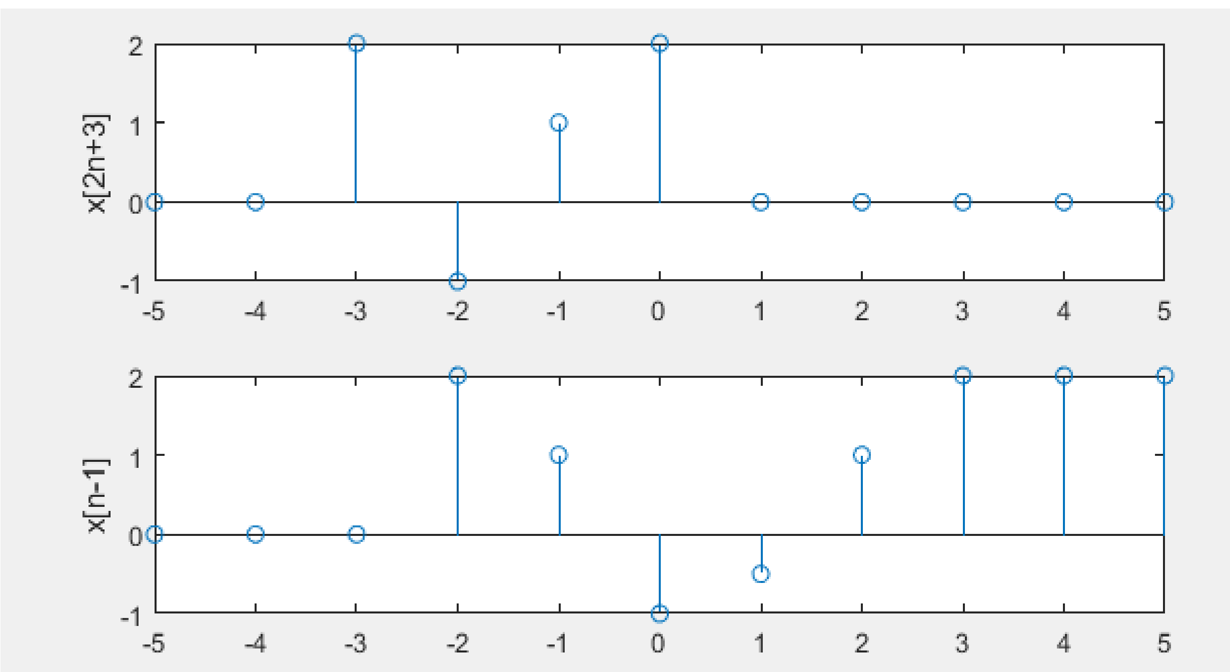


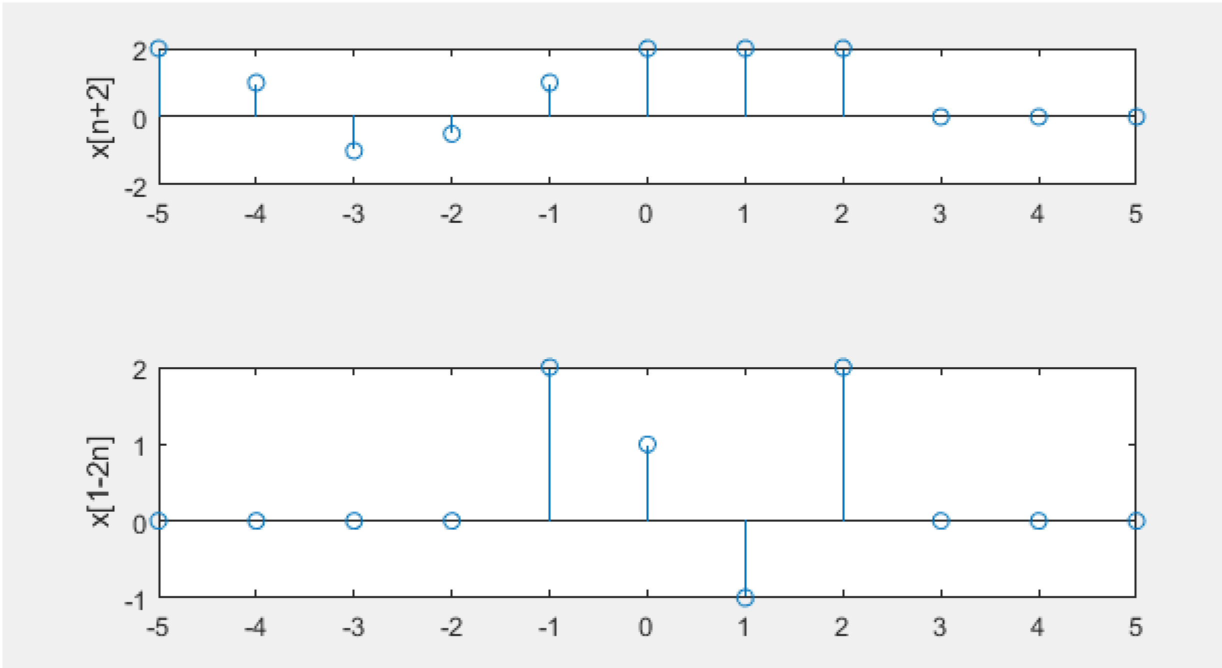


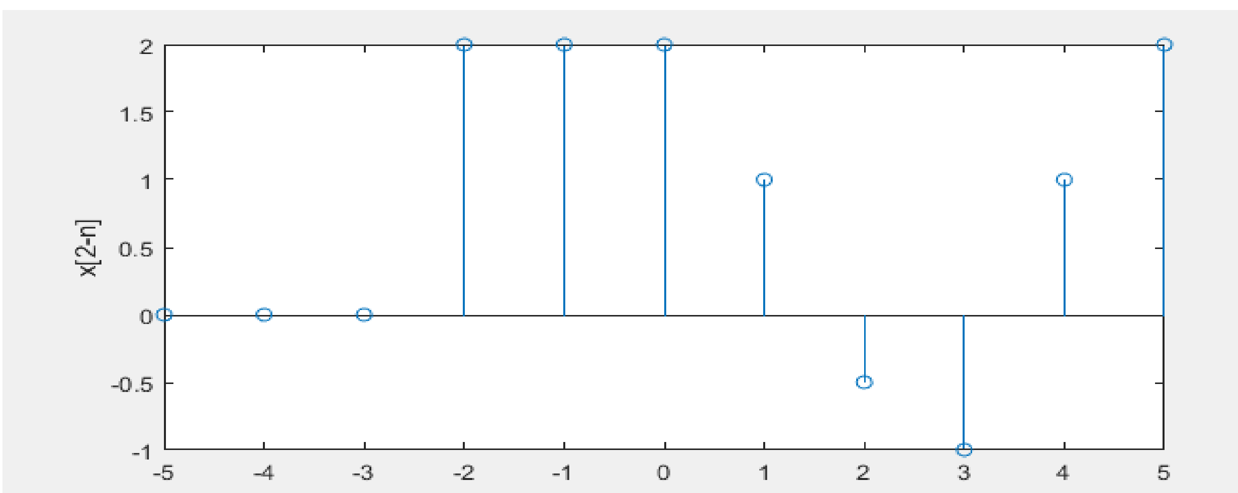
4. Given the discrete signal in the Fig 2, plot the following transformations

```
clc
clear all
close all
%%
%by changing values of to and so we can get desired shifted graphs
to=-3
so=2
%this particular values of to and so gives x[2n+3] ( x[so*n - to ] )
n = [-5 -4 -3 -2 -1 0 1 2 3 4 5];
x=zeros(1,length(n));

x(n==(-4+to)/so)=0;
x(n==(-3+to)/so)=2;
x(n==(-2+to)/so)=1;
x(n==(-1+to)/so)=-1;
x(n==(0+to)/so)=-0.5;
x(n==(1+to)/so)=1;
x(n==(2+to)/so)=2;
x(n==(3+to)/so)=2;
x(n==(4+to)/so)=2;
%ylim([-3 5]);
stem(n,x);
```







3. Given the signal x(t) in the Fig 1, Answer the following

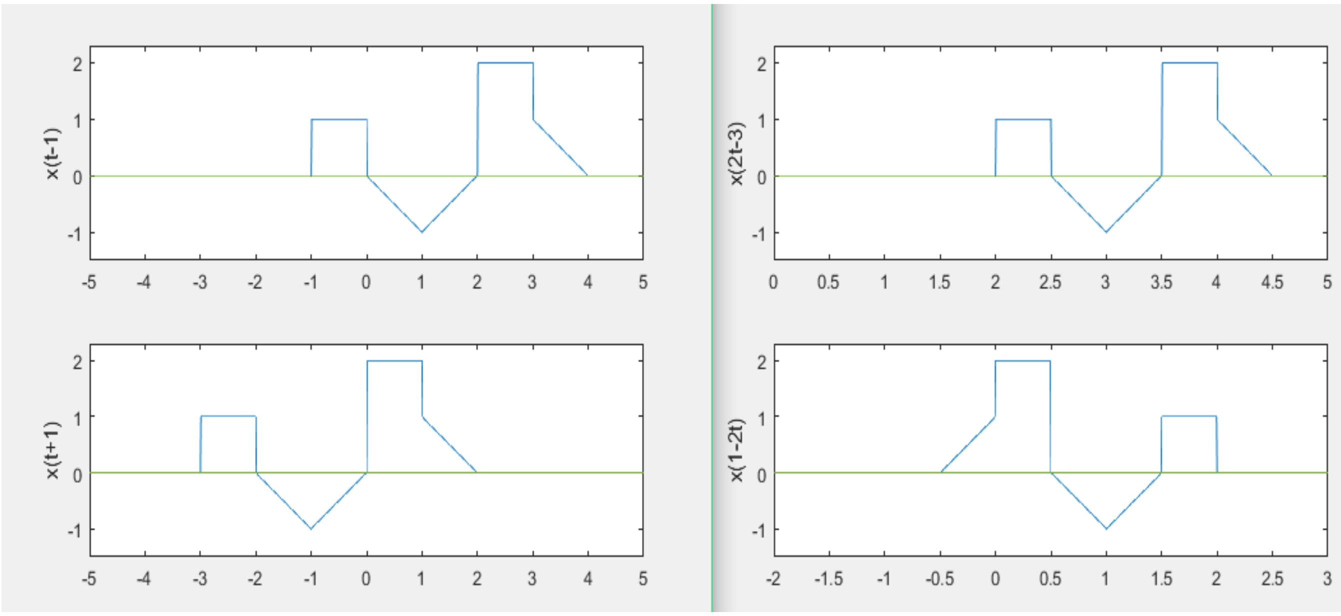
– Derive the signal x(t) in terms of the basic signals.

– Plot the following.

∗ x(t−1) ∗ x(t + 1) ∗ x(2t−3) ∗ x(1−2t)

```
clc
clear all
close all
%%
%various transformation of this can be obtained by making changes in time
%i.e.,t
t=-8:0.01:8;
ii=1
arr = zeros(length(t));
for i = 1:length(t)
    if t(i) <= -2
        arr(ii) = 0;     %when t<=-2 graph is 0
    elseif t(i)>=-2 && t(i)<=-1
        arr(ii)=1;  %when t is between -2 to -1 it is 1
    elseif t(i)>=-1 && t(i)<=0
        arr(ii) = -1 - (t(i));  %when t is between -1 to 0 it is -1-t
    elseif  t(i)>=0 && t(i)<=1
        arr(ii) = (t(i)) - 1;   %when t is between 0 to 1 it is t-1
    elseif  t(i)>=1 && t(i)<=2
        arr(ii) = 2;     %when t is between 1 to 2 it is 2
    elseif  t(i)>=2 && t(i)<=3
        arr(ii) = 3 - (t(i));
        %when t is between 2 to 3 it is 3-t
    end
    ii = ii +1;
end
plot(t,arr);
ylim([-1.5 2.3]);
xlim([-5 5]);
```

```
subplot(211);
%x(t-1)
plot(t+1,arr);
ylim([-1.5 2.3]);
xlim([-5 5]);
ylabel('x(t-1)');
%x(t+1)
subplot(212);
plot(t-1,arr);
ylim([-1.5 2.3]);
xlim([-5 5]);
ylabel('x(t+1)');
%x(2t-3)
figure;
subplot(211);
plot(t/2+3,arr);
ylim([-1.5 2.3]);
xlim([0 5]);
ylabel('x(2t-3)');
subplot(212);
plot(1-t/2,arr);
ylim([-1.5 2.3]);
xlim([-2 3]);
ylabel('x(1-2t)');
```



I. QUANTISATION

```
clc
clear all
close all
%%
fs = 100;
t=10;
t=0:1/fs:3*1/f;
x=sin(f*t);
q=0.5*rond(x/0.5);
figure;
subplot(211);
plot(t,x);
hold on;
stem(t,q);
ylabel('sin wave');
subplot(212);
stem(t,q-x);
ylabel('error');
```

Error: