	ELECTRICAL ENGINEERING DEPARTMENT (EEC 271) SIGNALS&SYSTEMS SPRING 2022 - 2023

LAB(2) REPORT

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Section:	4

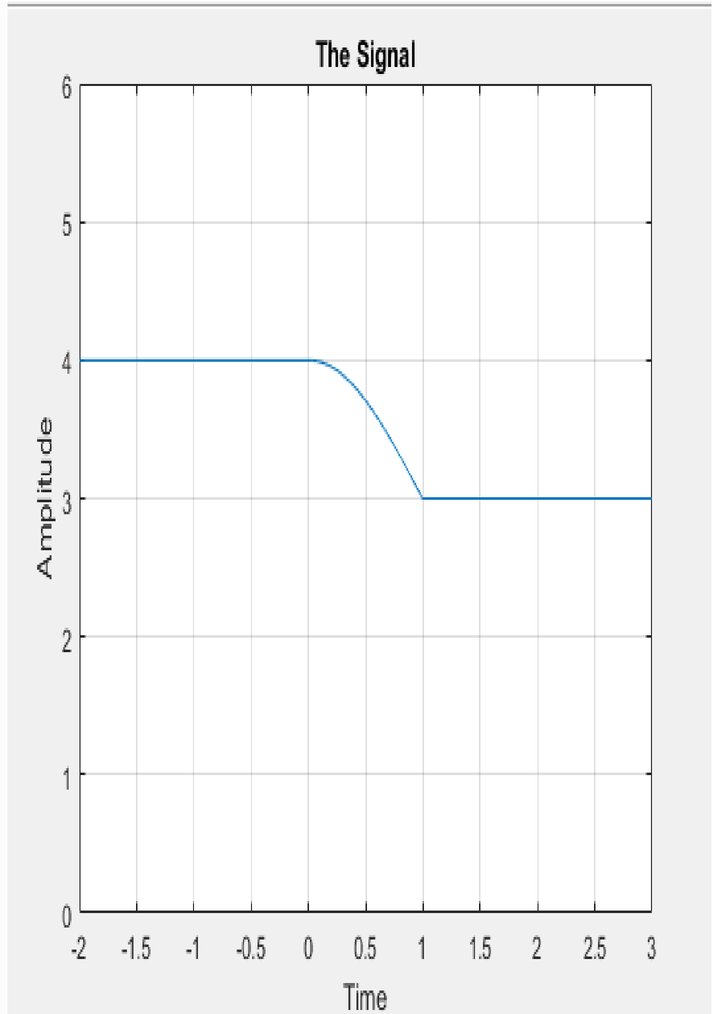
Department:	Electronics and Communication

Task 1

Code

```
clear all;
clc;
DcSignal_1 = 4 * ones( 1 , ( 2 - 0 ) * 100 );
t = linspace( 0 , 1 , 100 );
Sinusoidal_signal = cos( 2 * pi * ( t * 0.25 ) )+3;
DcSignal_2 = 3 * ones( 1 , ( 3 - 1) * 100 );
time = linspace( -2 , 3 , ( 3--2 ) * 100 );
Main_Signal = [ DcSignal_1 Sinusoidal_signal DcSignal_2 ];
figure
plot( time , Main_Signal );
axis( [ -2 3 0  6 ] );
title('The Signal');
xlabel('Time');
ylabel('Amplitude');
grid on;
```

Result

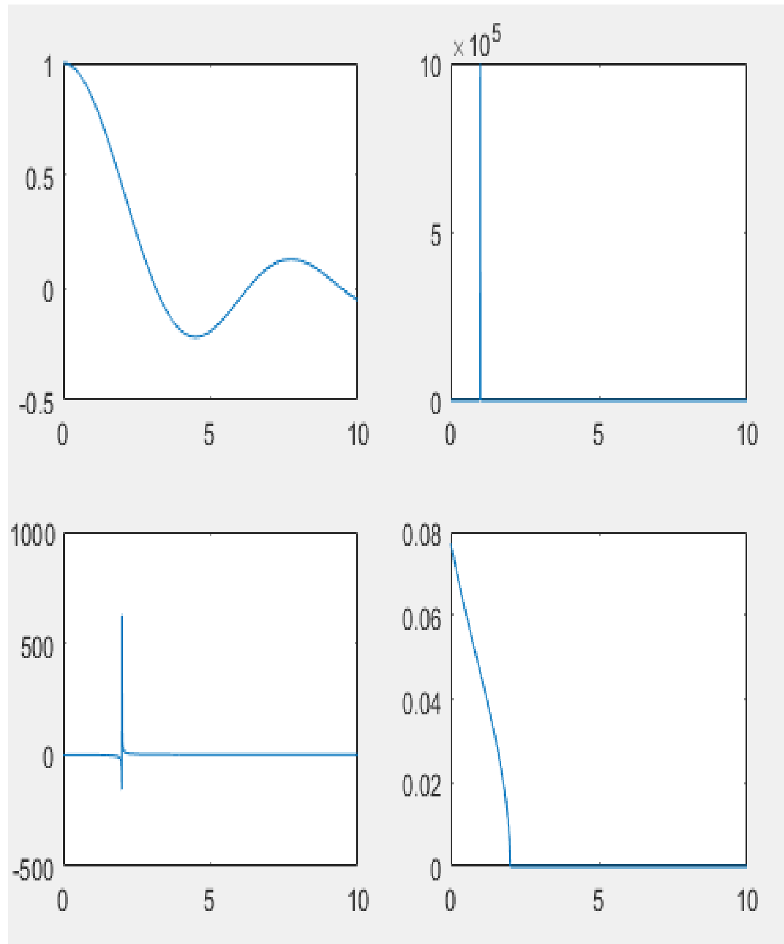


Task2

Code

```
clear all;
clc;
x = linspace( 0 , 10 , 1000 );
Y1 = sin( x ) ./ x;
Y2 = ( 1 ./ ( x - 1 ).^2 ) + x ;
Y3 = ( x.^2 + 1  ) ./ ( x.^2 - 4 ) ;
Y4 = ( 10 - x ).^(1/3) ./ (  4 - x.^2  ).^(1/2) ;
subplot(2,2,1)
plot(x,Y1)
subplot(2,2,2)
plot(x,Y2)
subplot(2,2,3)
plot(x,Y3)
subplot(2,2,4)
plot(x,Y4)
```

Result

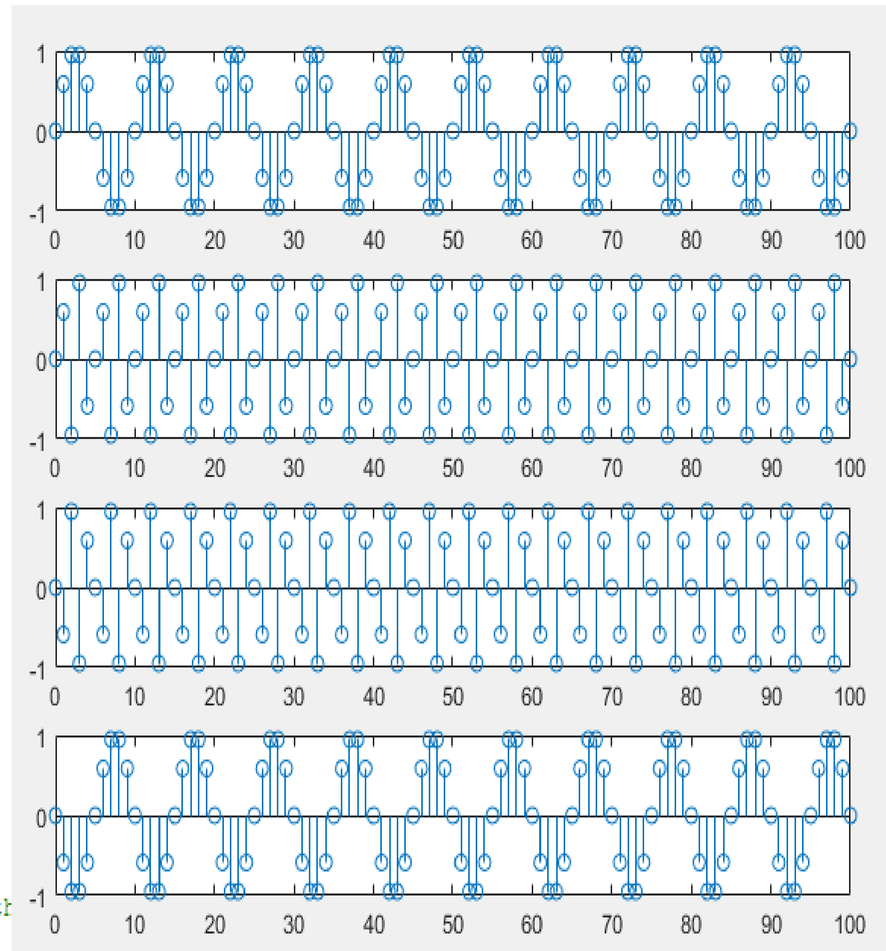


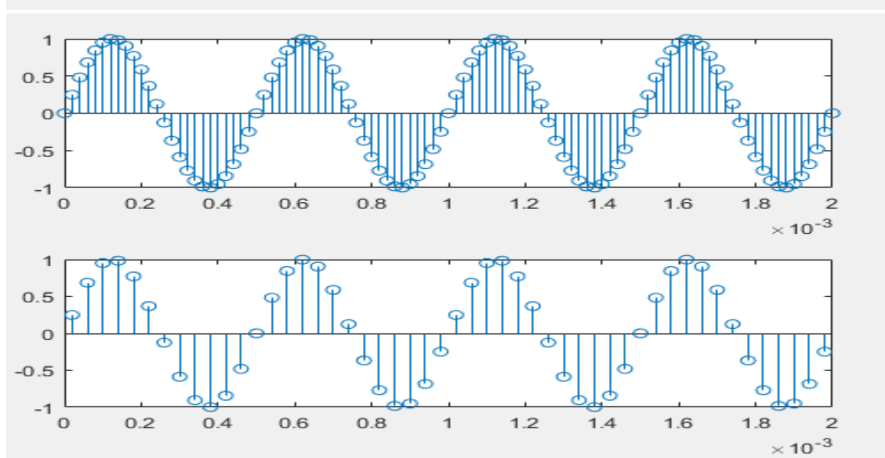
Task3

Code

```
clc
n=0:100;
%defining number of samples 100 sample.
t=n./5000;
%no of samples(n) = time(t) / samplinf frequency(500)
x1=sin(2*pi*500*t);
x2=sin(2*pi*2000*t);
x3=sin(2*pi*3000*t);
x4=sin(2*pi*4500*t);
%4functions for the 4 different values of f0
%plotting the signals using stem function
subplot(4,1,1);
stem(n,x1);
subplot(4,1,2);
stem(n,x2);
subplot(4,1,3);
stem(n,x3);
subplot(4,1,4);
stem(n,x4);
% when fs=50000anf f0=2000
t_new=n./50000;
%definning a new time
t_new_even=t_new(2:2:100);
%to select only even samples we take step of 2 from th
x_new=sin(2*pi*2000*t_new);
x_new_even=x_new(2:2:100);
%plottinf the new fun tions
figure;
subplot(2,1,1);
stem(t_new,x_new);
subplot(2,1,2);
stem(t_new_even,x_new_even);
```

Result





First comment

Similarities	Differences
They have the same amplitude.	Different number of samples.
They are all periodic .number.	Different accuracy due to samples

Second comment

1-frequency of x(n)= 1/25 =0.04

2-y(n) is periodic with frequency =2/25 =0.08

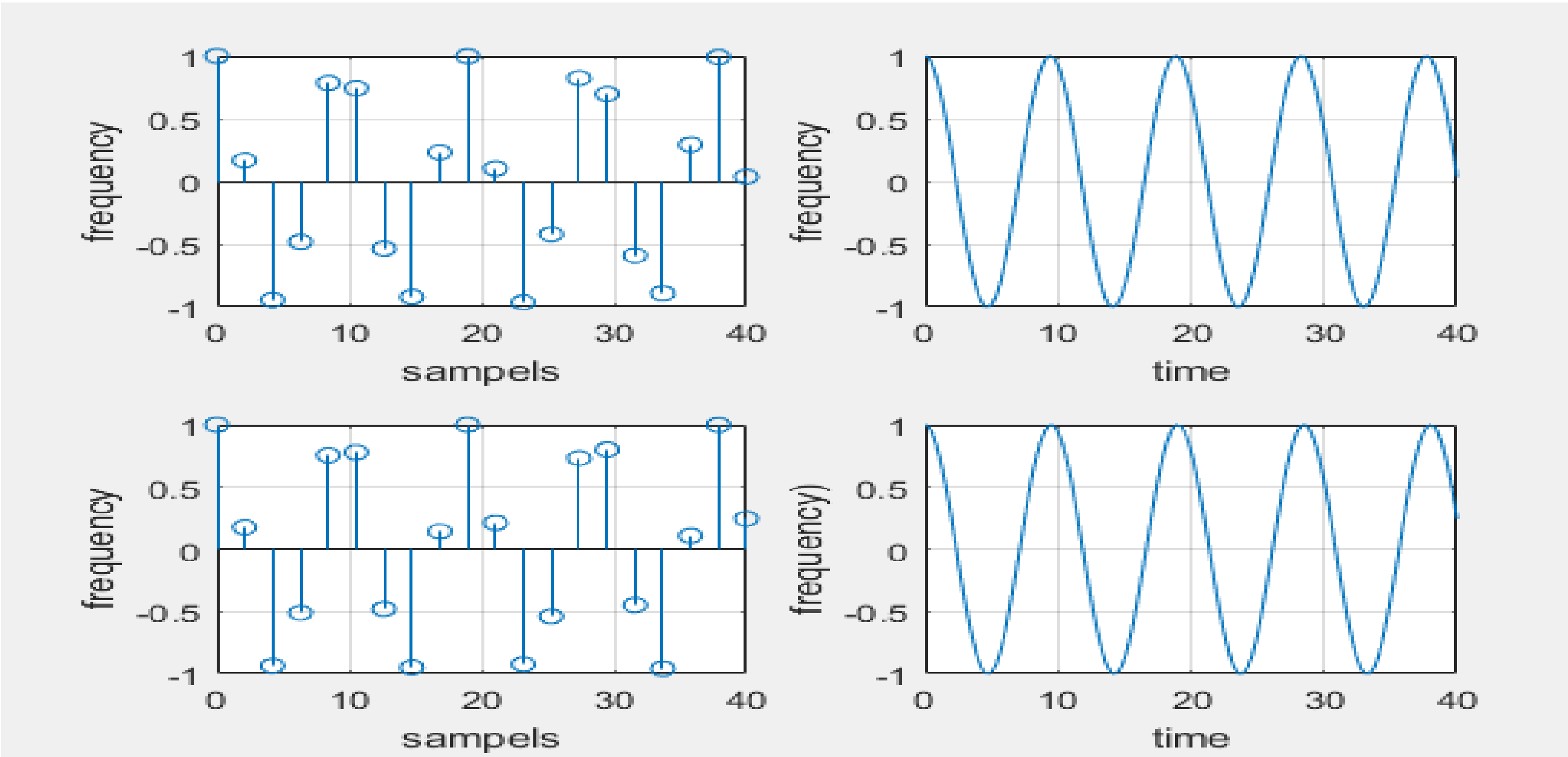
TASK4

CODE

```
clear
n=linspace(0,40,20);
t=linspace(0,40,4000);
%----------------------------------;
Xdis=cos((2.*n)./3);%disrete signal
Xcont=cos((2.*t)./3);%contineous signal
%-------------------------------------;
Ydis=cos((8.*pi.*n)./38)%disrete signal
Ycont=cos((8.*pi.*t)./38)%contineous signal
%--------------------------------------;
subplot(2,2,1)
stem(n,Xdis)
xlabel('sampels');
ylabel('frequency');
grid on;
```

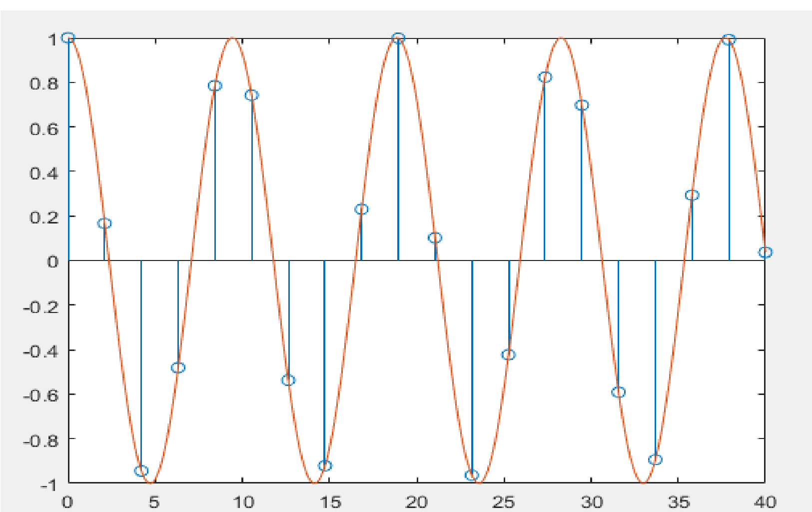
```
subplot(2,2,3);
stem(n,Ydis);
xlabel('sampels');
ylabel('frequency');
grid on;
subplot(2,2,4);
plot(t,Ycont);
xlabel('time');
ylabel('frequency)');
grid on;
%for better vesion of the functions
figure;
stem(n,Xdis,'k-o');
figure;
stem(n,Ydis,'k-o');
figure;
plot(t,Xcont);
```

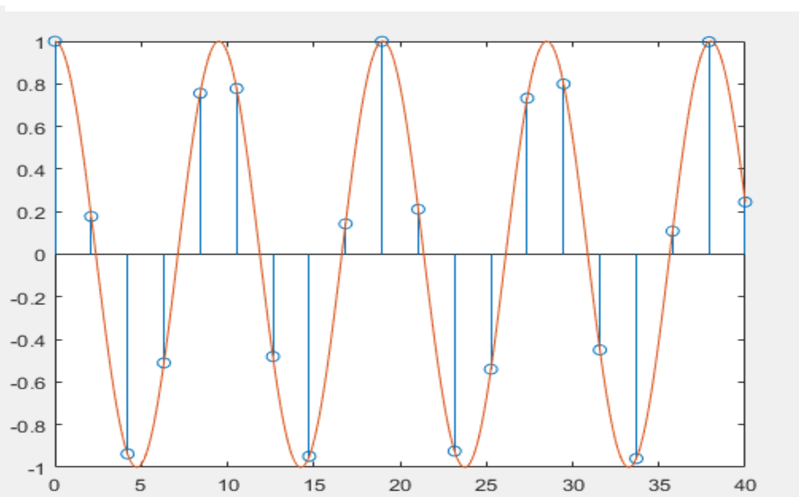
Result



Comment:

- The sequences are **PERIODIC**
- In one period for the continuous signals it
- Makes 1cycle every 10 seconds





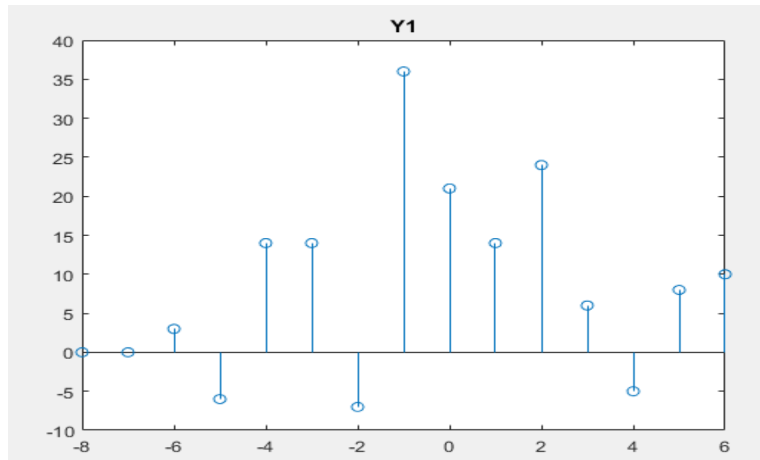
Task5

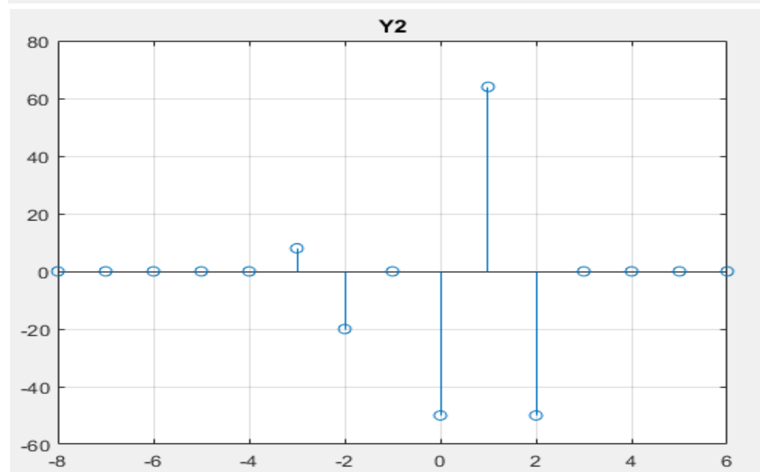
Code

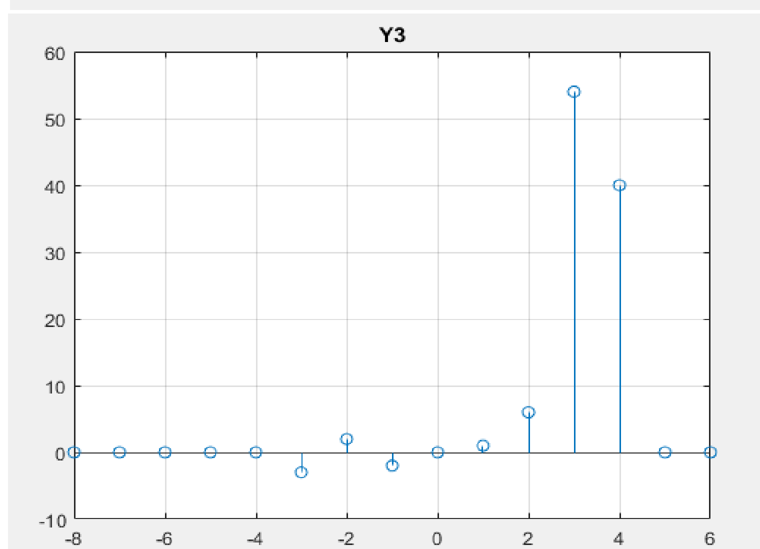
```
clc
x=[0,0,0,0,1,-2,4,6,-5,8,10,0,0,0,0];  %define the sequence
n=linspace(-8,6,15);
%---------------------------;
%defining the terms of the first magnitude.
x11=3*[ x(3:end) zeros(1,2)]; %3x(n+2)
x12=[zeros(1,4) x(1:end-4)];  %x(n-4)
x13=2*x;                      %2x
figure;
y1=x11+x12+x13;               %3x(n+2)+x(n-4)+2x
stem(n,y1);
title('Y1');
%----------------------------;
%defining the terms of the second magnitude.
x21=[x(5:end) zeros(1,4)];      %x(n+4)
x22= [zeros(1,1) x(1:end-1)];   %x(n-1)
xtemp= [x(3:end) zeros(1,2)];
x23= [ zeros(1,2) xtemp(end:-1:3)]; %x(2-n)
y2=(x21.*x22)+(x23.*x);

figure;
stem(n,y2);
grid on;
title('Y2');
%----------------------------;
figure;
y3=n.*[zeros(1,1) x(1:end-1)] + n.*[zeros(1,2) x(1:end-2)]
+ n.*[zeros(1,3) x(1:end-3)] + n.*[zeros(1,4) x(1:end-4)]
+n.*[zeros(1,5) x(1:end-5)];
stem(n,y3);
grid on;
title('Y3');
```

Result







Task6

Code

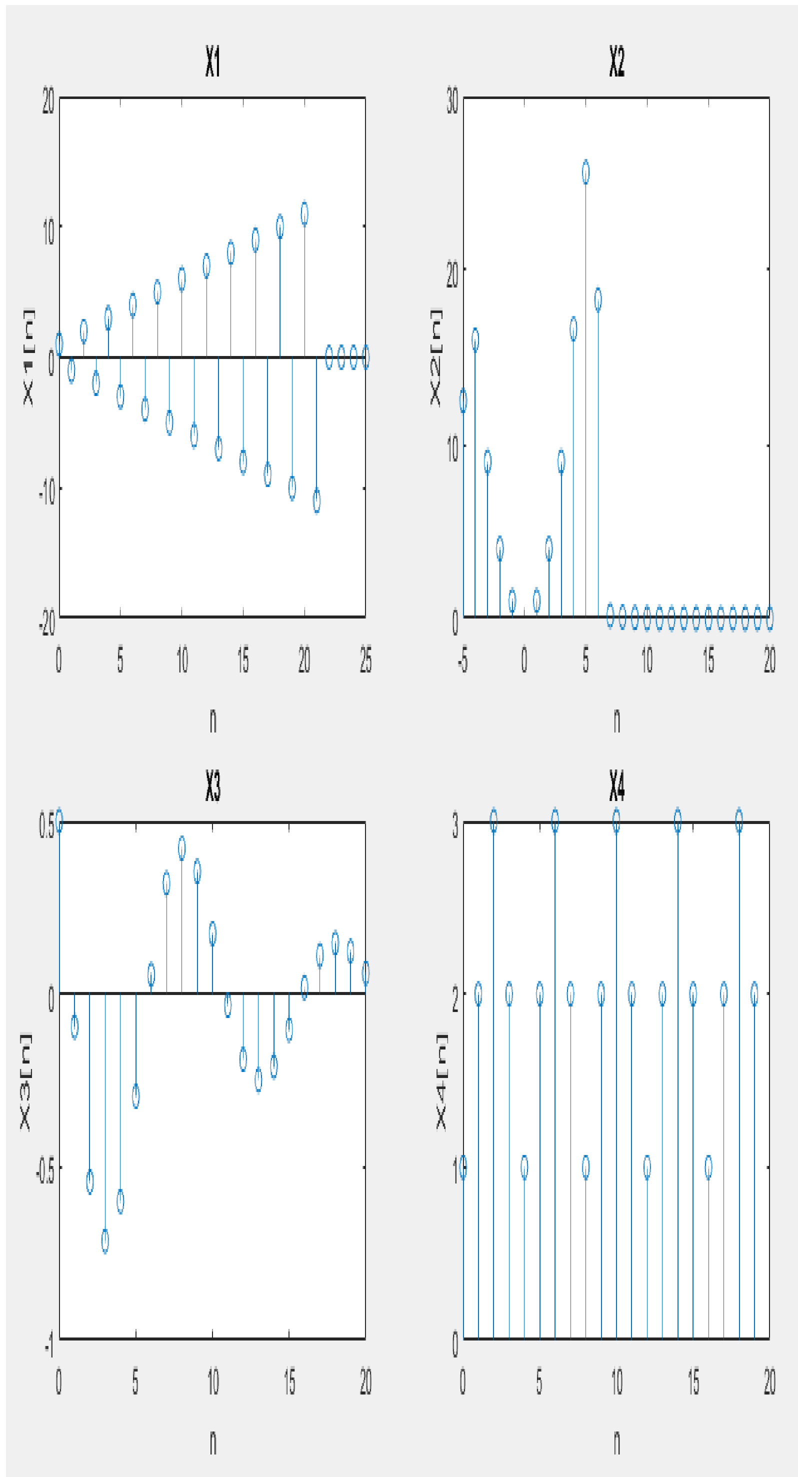
Result

```
%Clear Command window
clear all;
clc;
%a)
n1 = 0 : 25;
X1= zeros( size( n1 ) );
for m = 0 : 10
    X1 = X1 + ( ( m+1 ) * ( dirac( n1 - 2 * m ) - dirac( n1 - 2 * m - 1  ) ) ) ;
    X1( X1 == Inf ) = m + 1 ;
    X1( X1 == -Inf ) = -( m + 1 ) ;
end

%b)
n2 = -5 : 20 ;
X2 = (n2.^2) .*( heaviside( n2 + 5 ) - heaviside( n2 - 6 ) ) + 10 * dirac( n2 ) +  20 .* 0.5.^( n2

%c)
n3 = 0 : 20 ;
X3 = ( (0.9).^n3 ) .* cos( 0.2 * pi * n3 + pi / 3 );

%d)
n4 = 0 : 19 ;
period_of_X4 = [1, 2, 3, 2];
X4 = repmat(period_of_X4, 1, 5);
%a)
subplot(2,2,1);
stem(n1, X1);
xlabel('n');
ylabel('X1[n]');
title('X1');
%b)
subplot(2,2,2);
stem(n2, X2);
xlabel('n');
ylabel('X2[n]');
title('X2');
%c)
subplot(2,2,3);
stem(n3, X3);
xlabel('n');
ylabel('X3[n]');
title('X3');
%d)
subplot(2,2,4);
stem(n4, X4);
xlabel('n');
ylabel('X4[n]');
title('X4');
```



Task7

Code

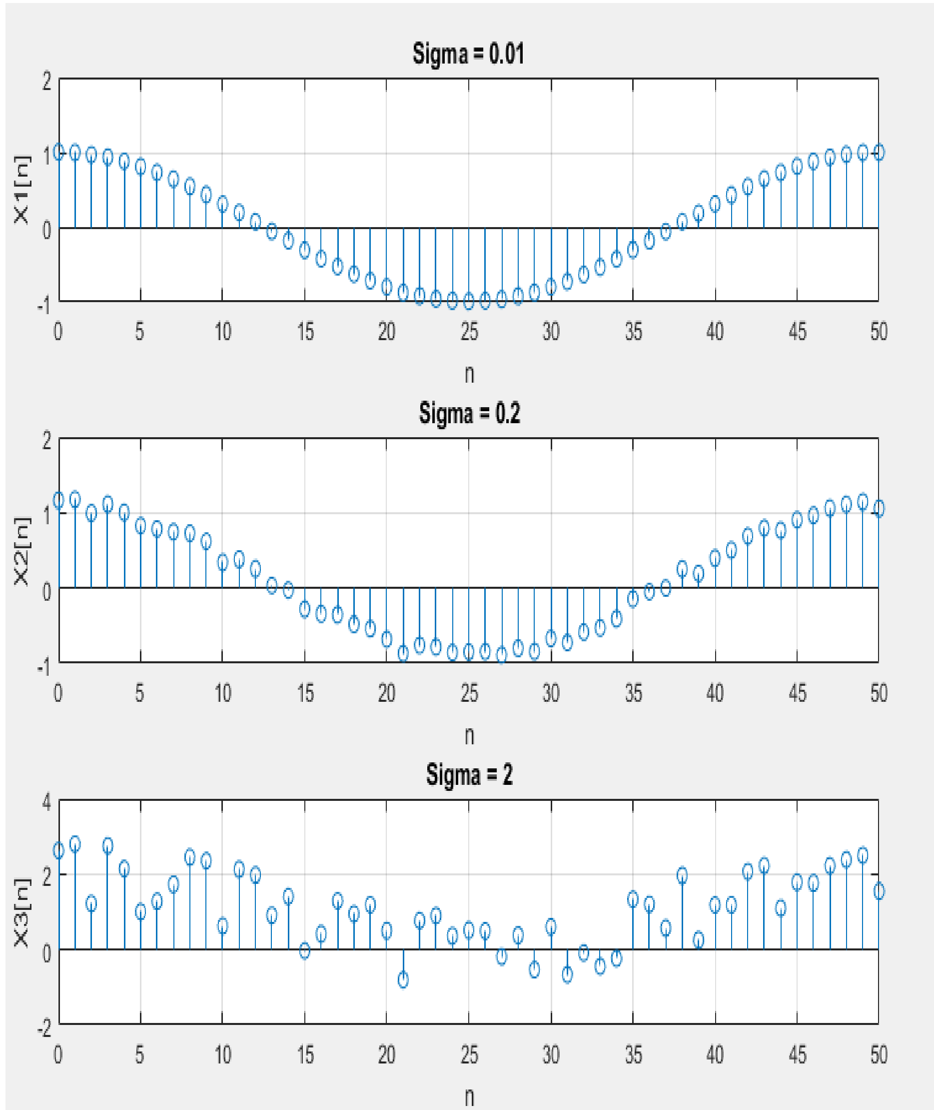
```
Clear Command window
clear all;
clc;
%Generating n which from 0 to 50 by step 1
n = 0 : 50 ;
W = rand( 1 , 51 ) ;
%At sigma = 0.01
sigma = 0.01 ;
X1 = cos( 0.04 * pi * n ) + sigma * W ;
%At sigma = 0.2
sigma = 0.2 ;
X2 = cos( 0.04 * pi * n ) + sigma * W ;
%At sigma = 2
sigma = 2 ;
X3 = cos( 0.04 * pi * n ) + sigma * W ;
%Ploting the graphs

subplot( 3 , 1 , 1 )
stem(n,X1)
title('Sigma = 0.01');
xlabel('n');
ylabel('X1[n]');
grid on;

subplot( 3 , 1 , 2 )
stem(n,X2)
title('Sigma = 0.2');
xlabel('n');
ylabel('X2[n]');
grid on;

subplot( 3 , 1 , 3 )
stem(n,X3)
title('Sigma = 2');
xlabel('n');
ylabel('X3[n]');
grid on;
```

Result



comment

-as the sigma increase the distortion increase and accuracy decrease.

Task8

Code

```
n=-10:1:10;
signal=exp(n.*(-0.1+0.3i));
%-------------------;
%function real returns the real part of
Real_part=real(signal);
subplot(2,2,1)
stem(n,Real_part);
grid on;
ylabel('Real');
xlabel('samples');
title('Real');
%-------------------;
%function imaginary returns the imaginar
Imaginary_part=imag(signal);
subplot(2,2,2)
stem(n,Imaginary_part);

grid on;
ylabel('Imaginary');
xlabel('samples');
title('Imaginary');
%-----------------;
%function abs returns the magnitude of the signal
Magnitude=abs(signal);
subplot(2,2,3)
stem(n,Magnitude);
grid on;
ylabel('Magnitude');
xlabel('samples');
title('Magnitude');
%------------------;
%function anglereturns the angle of the signal
Angle=angle(signal);
subplot(2,2,4)
stem(n,Angle);
grid on;
ylabel('Angle');
xlabel('samples');
title('angle');
```

Result