ASSIGNMENT 2

NAMES

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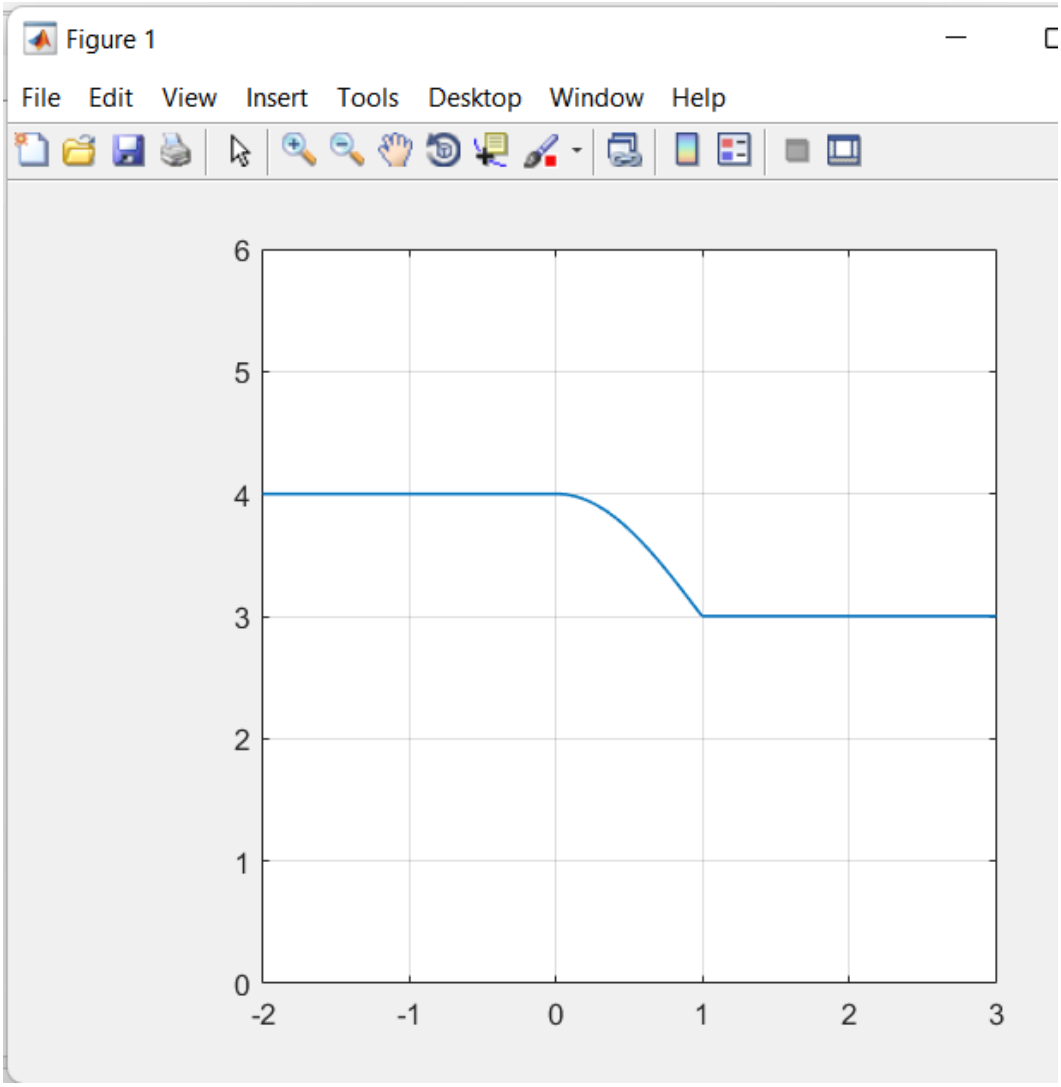
QUESTION 1

Editor - D:\Softwares\Matlab\Assi\A2\Q1.m

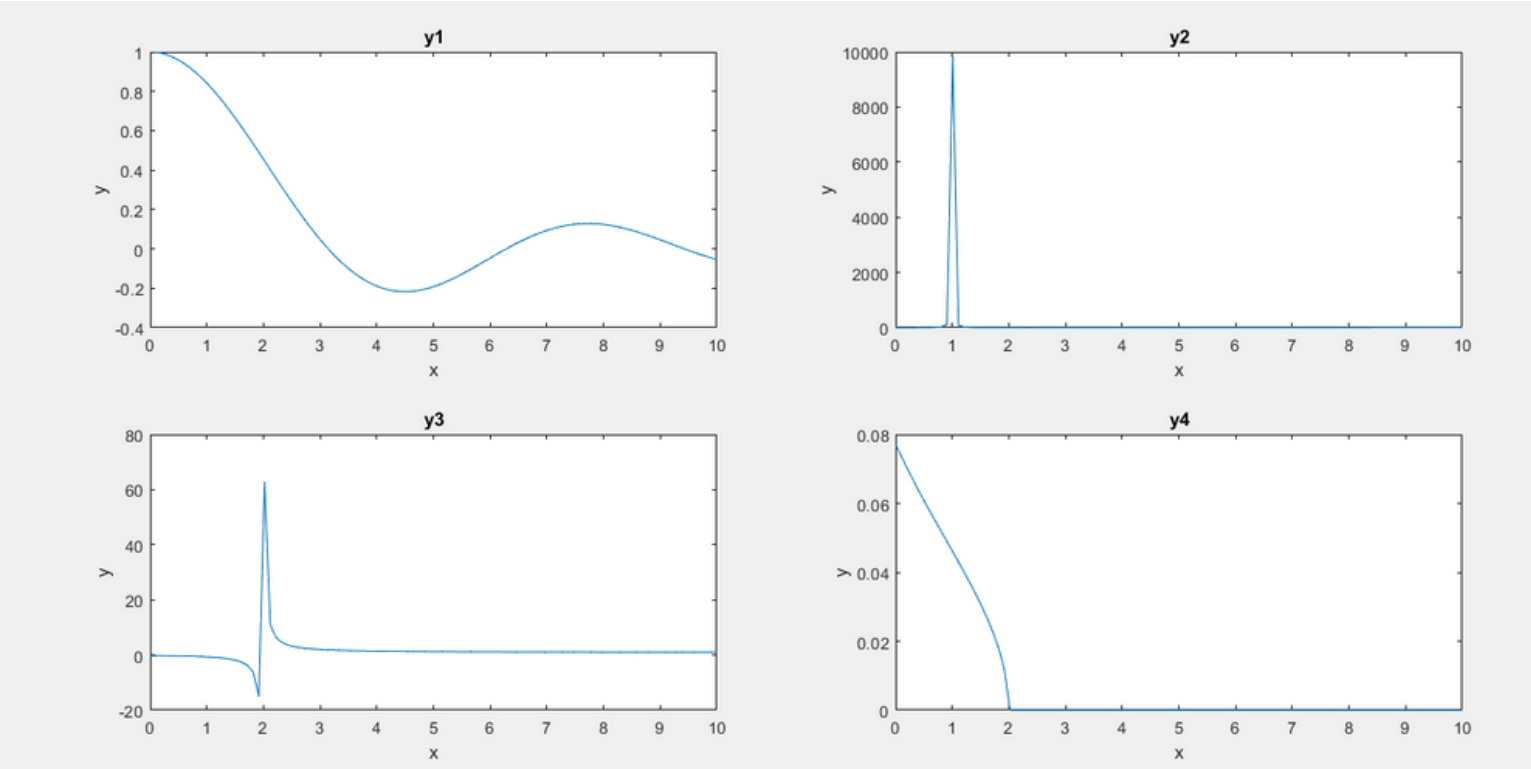
Q1.m

```
1 -    a= 4*ones(1,200);
2 -    t1= linspace(0,1,100);
3 -    b= cos(2*pi*t1/4)+3;
4 -    c= 3*ones(1,200);
5 -    t2= linspace(-2,3,500);
6 -    d= [a b c];
7 -    figure;
8 -    plot(t2,d,'lineWidth',1);
9 -    axis([-2 3 0 6], 'square'); grid on;
```



QUESTION 2

```
x = linspace(0, 10, 100);
y1 = sin(x)./x;
y2 = (1./(x-1).^2)+x;
y3=(x.^2+1)./(x.^2-4);
y4=((10-x).^(1/3)-2)./((4-x.^2).^(1/2));
subplot(2, 2, 1);
plot(x, y1);title('y1');xlabel('x');ylabel('y');
subplot(2, 2, 2);
plot(x, y2);title('y2');xlabel('x');ylabel('y');
subplot(2, 2, 3);
plot(x, y3);title('y3');xlabel('x');ylabel('y');
subplot(2, 2, 4);
plot(x, y4);title('y4');xlabel('x');ylabel('y');
```



QUESTION 3

Editor - D:\Softwares\Matlab\Assi\A2\Q3.m*

Q1.m | Q3.m* | Q7.m

```
n=0:100;
Fs=5000;
Xa1=sin(2*pi*500*n/Fs);
Xa2=sin(2*pi*2000*n/Fs);
Xa3=sin(2*pi*3000*n/Fs);
Xa4=sin(2*pi*4500*n/Fs);
figure;
stem(n,Xa1);
title('Xa1');
figure;
stem(n,Xa2);
title('Xa2');
figure;
stem(n,Xa3);
title('Xa3');
figure;
stem(n,Xa4);
title('Xa4');
Fs=50000;
Fo=2000;
X=sin(2*pi*Fo*n/Fs);
figure;
stem(n,X);
title('X[n]');
n=0:2:100;
y=sin(2*pi*Fo*n/Fs);
figure;
stem(n,y);
title('y[n]');
```

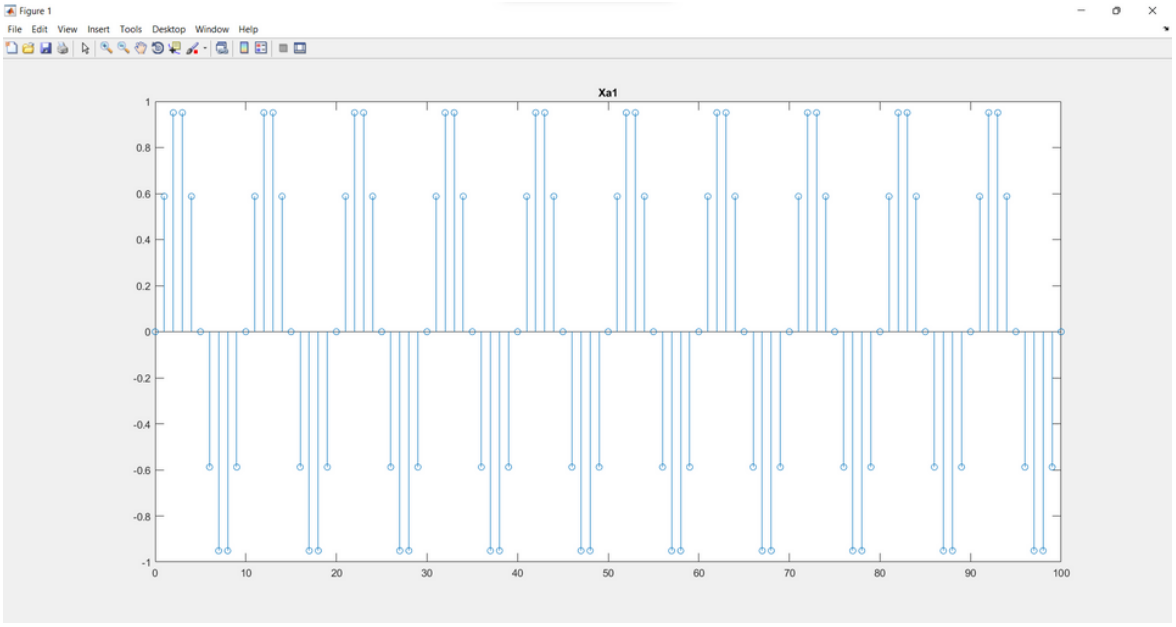


Figure 1
File Edit View Insert Tools Desktop Window Help
Xa1
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
10
20
30
40
50
60
70
80
90
100

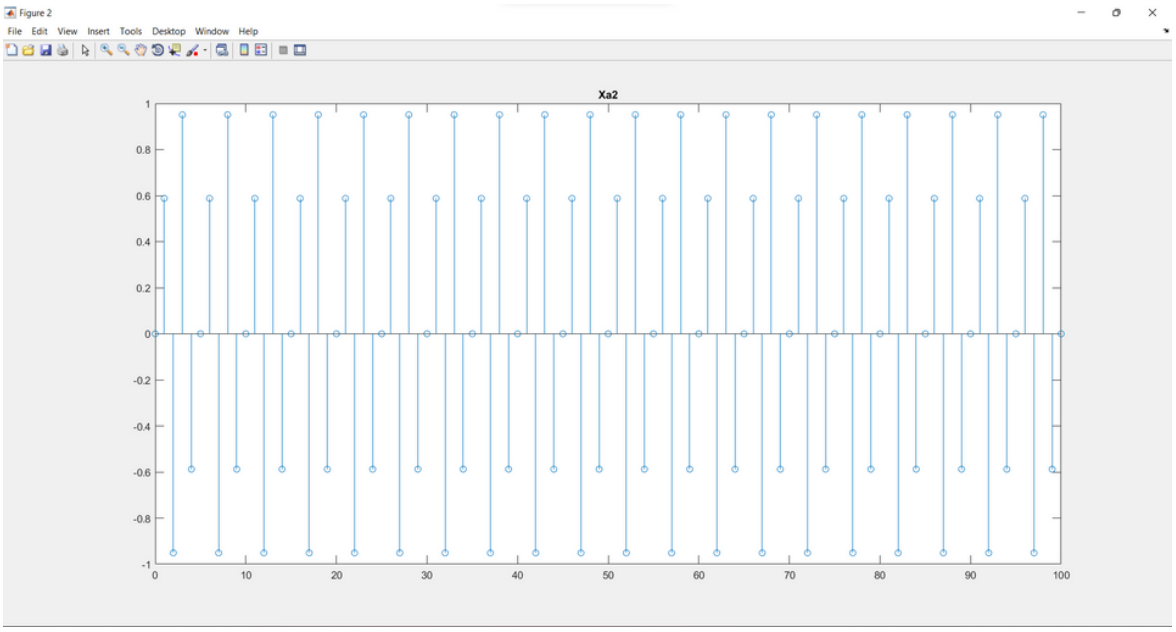
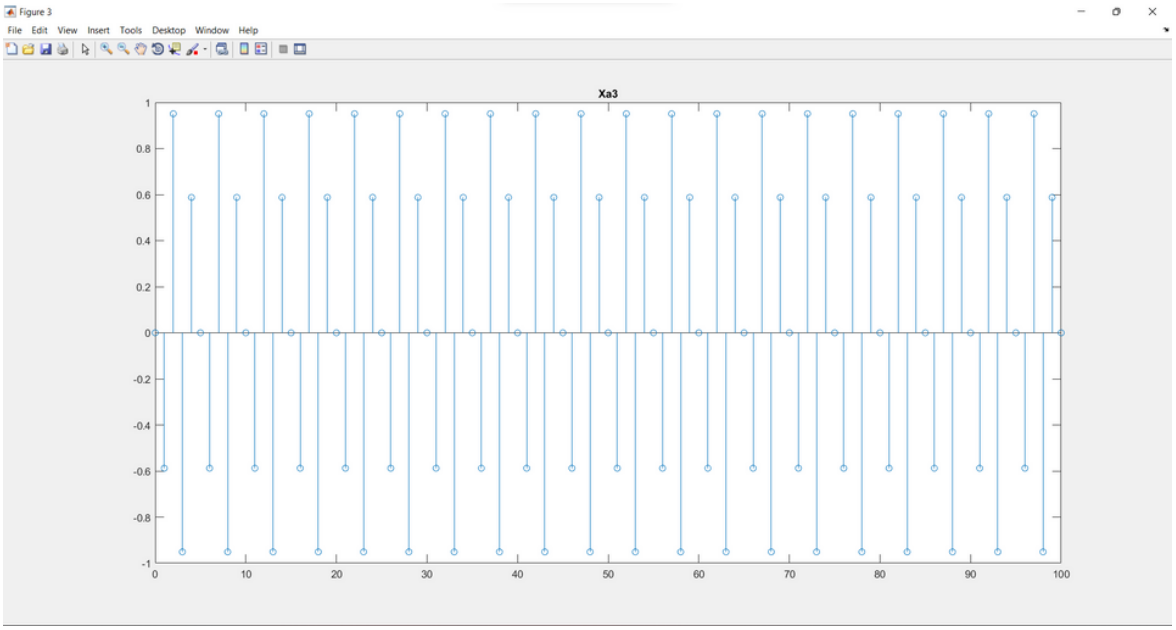
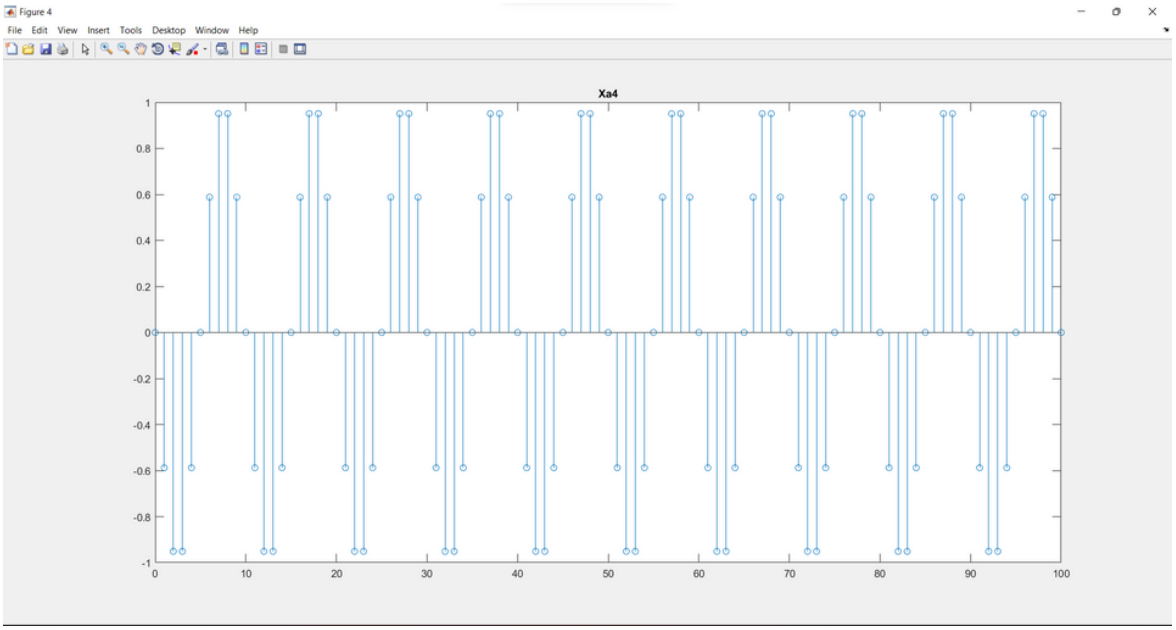
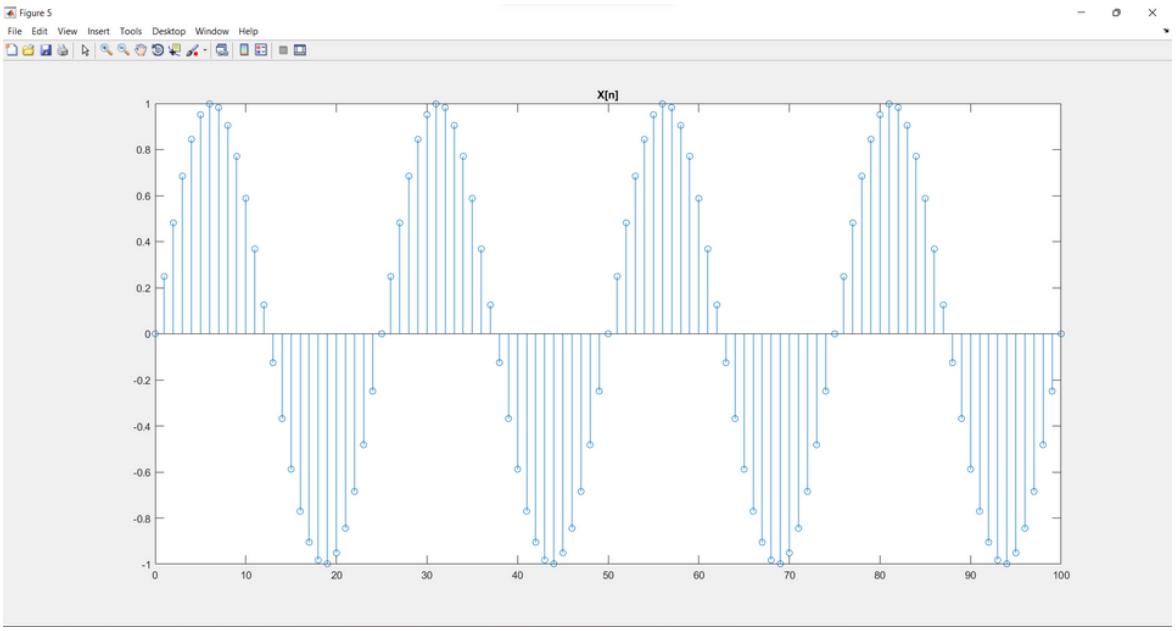


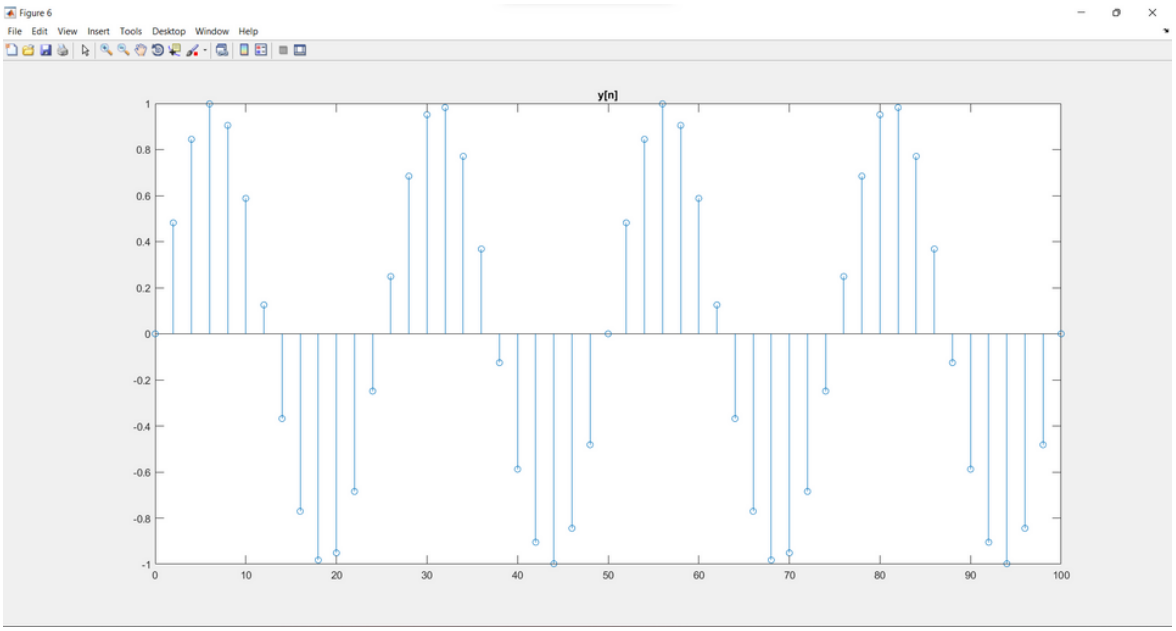
Figure 2
File Edit View Insert Tools Desktop Window Help
Xa2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
10
20
30
40
50
60
70
80
90
100





Comment: The plots are similar sampling rate (Fs) at 5 kHz. The difference is in frequencies (Fo) of the original signal. These differences influence both the shape and frequency of the resulting sampled signal (x[n])





Comment: x[n] is periodic with frequency 1/25 HZ
y[n] is non periodoc because it doesn't have the same amplitude over the whole range.

QUESTION 4

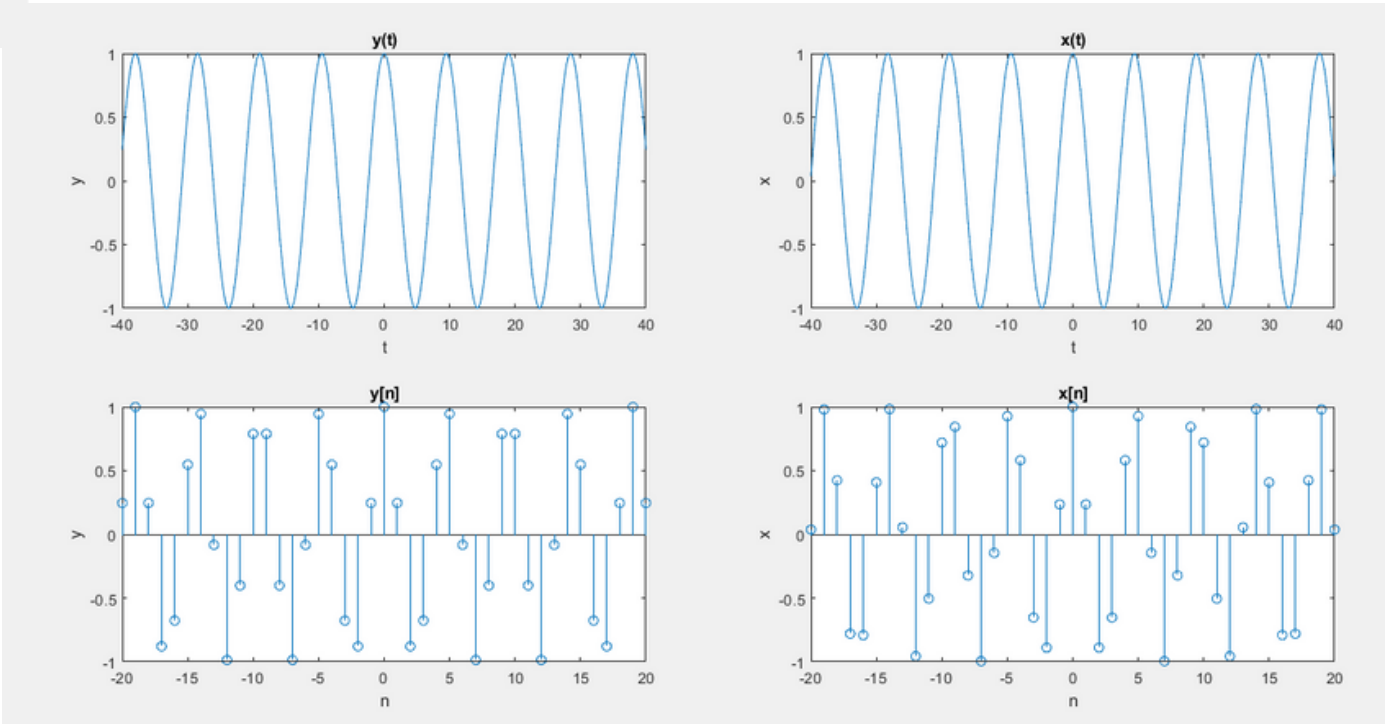
```
t=linspace(-40,40,1000);
n=-20:20;

x_of_t=cos(2*t/3);
y_of_t=cos(8*pi*t/38);

x_of_n=cos(2*(2*n)/3);
y_of_n=cos(8*pi*(2*n)/38);

subplot(2, 2, 1);plot(t,y_of_t);
title('y(t)');xlabel('t');ylabel('y');
subplot(2, 2, 2);plot(t,x_of_t);
title('x(t)');xlabel('t');ylabel('x');

subplot(2, 2, 3);stem(n,y_of_n);
title('y[n]');xlabel('n');ylabel('y');
subplot(2, 2, 4);stem(n,x_of_n);
title('x[n]');xlabel('n');ylabel('x');
% x[n] is not periodic
% y[n] is periodic its period = 19 seconds
% nearly two cycles are in one period
```



Comment: x[n] is not periodic

y[n] is periodic its period = 19 seconds nearly two cycles are in one period

QUESTION 5

Editor - D:\Softwares\Matlab\Assi\A2\Q5.m*

Q1.m | Q3.m | Q7.m | Q5.m*

```
x = [1,-2,4,6,-5,8,10];
a = 5;b = 7;
x_pad = [zeros(1,a) x zeros(1,b)];
x_pad_in = (1:length(x_pad)) - (a+5);

x_plus_2 = [zeros(1,a-2) x zeros(1,b+2)];
x_minus_4 = [zeros(1,a+4) x zeros(1,b-4)];
x1= 3*x_plus_2+x_minus_4+2*x_pad;
figure;
stem(x_pad_in,x1);
title('x1');

x_plus_4 = [zeros(1,a-4) x zeros(1,b+4)];
x_minus_1 = [zeros(1,a+1) x zeros(1,b-1)];
x_reverse = [zeros(1,a+2) fliplr(x) zeros(1,b-2)];
x_reverse_2 = [zeros(1,a+4) fliplr(x) zeros(1,b-4)];
x2 = (x_plus_4 .* x_minus_1) ...
+ (x_reverse_2 .* x_pad);
figure;
stem(x_pad_in,x2);
title('x2');

x3 = 0;
for k=1:5
    x_of_k = [zeros(1,a+k) x zeros(1,b-k)];
    x3 = x3 + x_pad_in .* x_of_k;
end
figure;
stem(x_pad_in,x3);title('x3');
```

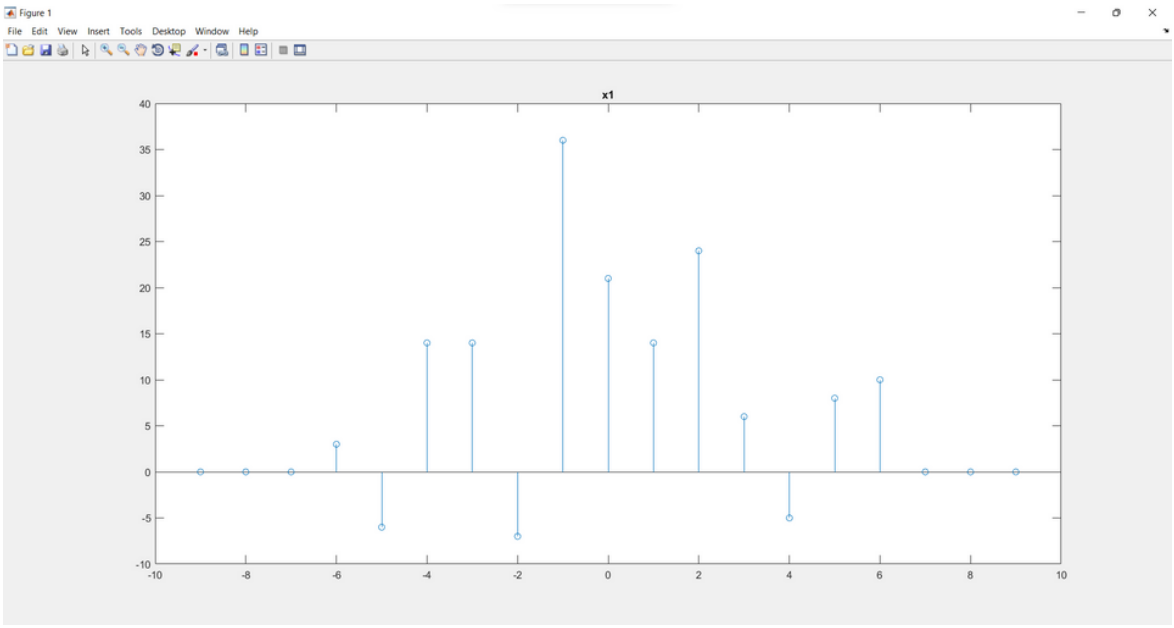


Figure 1
File Edit View Insert Tools Desktop Window Help
x1
40
35
30
25
20
15
10
5
0
-5
-10
-10 -8 -6 -4 -2 0 2 4 6 8 10

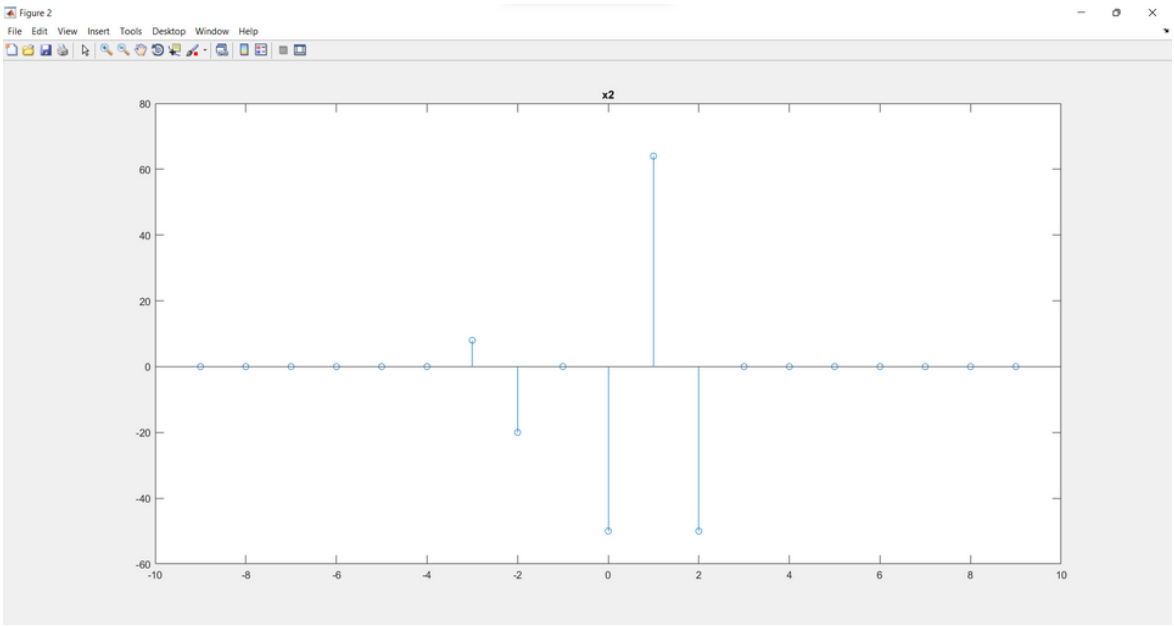


Figure 2
File Edit View Insert Tools Desktop Window Help
x2
80
60
40
20
0
-20
-40
-60
-10 -8 -6 -4 -2 0 2 4 6 8 10

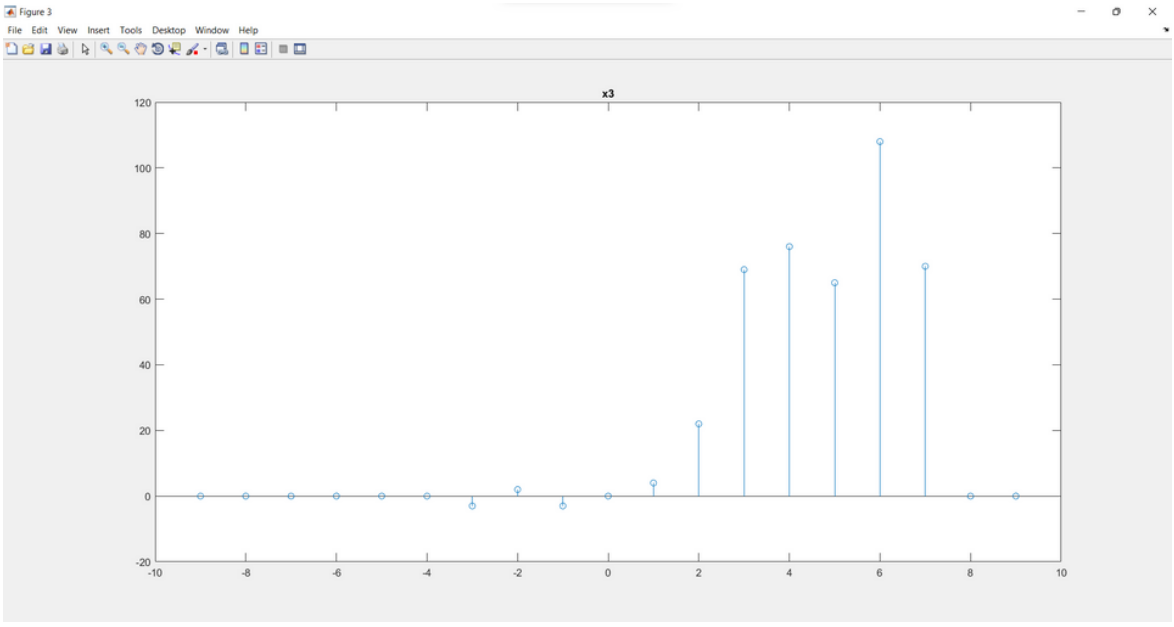


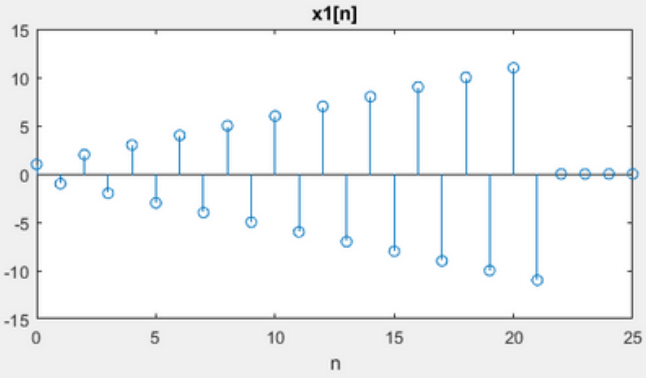
Figure 3
File Edit View Insert Tools Desktop Window Help
x3
120
100
80
60
40
20
0
-20
-10 -8 -6 -4 -2 0 2 4 6 8 10

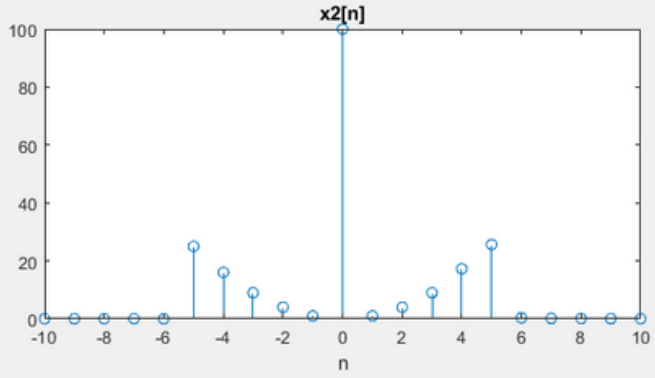
QUESTION 6

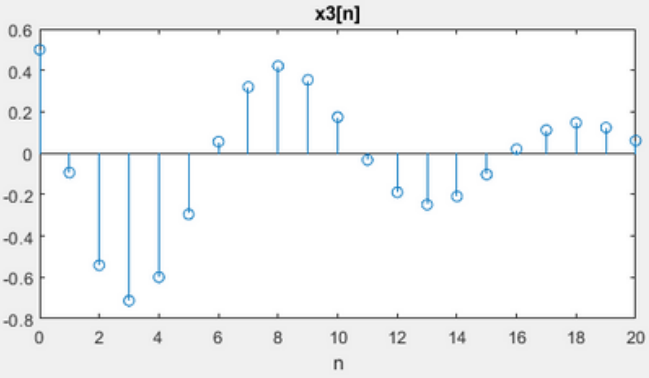
```
%a
n=0:25;
x1=0;
for m=0:10
  delta1=(n==(2*m))*1;
  delta2=(n==(2*m+1))*1;
  x1=x1+(m+1).*(delta1-delta2);
end
subplot(2,2,1);stem(n,x1);
title('x1[n]');xlabel('n');
%b
n=-10:10;
x2_2=(n==0)*10;
u_1=heaviside(n+5);
u_1(n==-5)=1;
u_2=heaviside(n-6);
u_2(n==6)=1;
u_3=heaviside(n-4);
u_3(n==4)=1;
u_4=heaviside(n-10);
u_4(n==10)=1;
x2= (n.^2).*(u_1-u_2)+10.*x2_2+20.*(0.5.^n).*(u_3-u_4);
subplot(2,2,2);stem(n,x2);
title('x2[n]');xlabel('n');
```

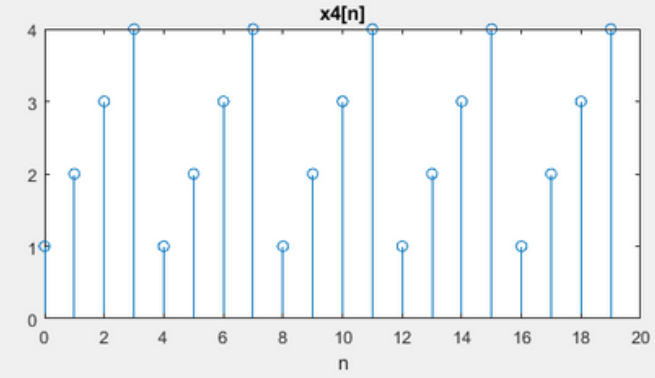
```
25      %c
26 -    n= 0:20;
27 -    x3= (0.9.^n).*cos(0.2*pi*n+(pi/3));
28 -    subplot(2,2,3);stem(n,x3);
29 -    title('x3[n]');xlabel('n');
30      %d
31 -    n=0:19;
32 -    i=[1,2,3,4];
33 -    x4=[i i i i i];
34 -    subplot(2,2,4);stem(n,x4);
35 -    title('x4[n]');xlabel('n');
```

QUESTION 6







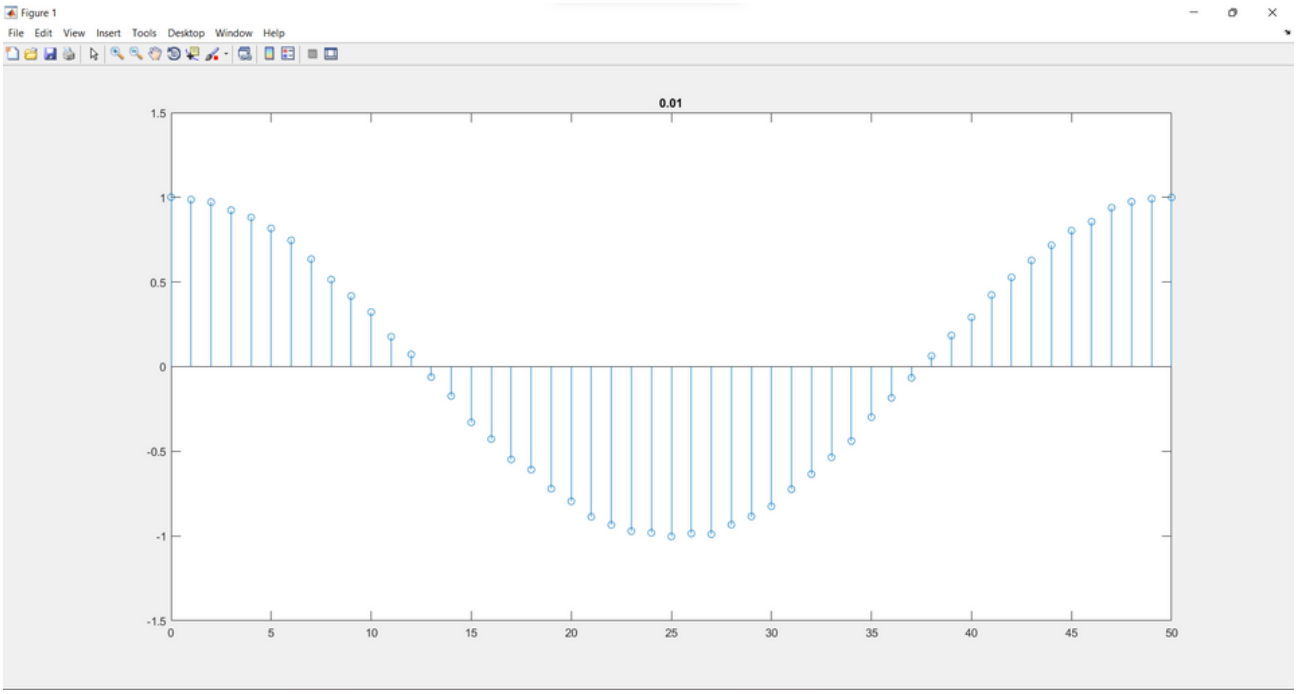


QUESTION 7

Editor - D:\Softwares\Matlab\Assi\A2\Q7.m

Q1.m | Q3.m | Q7.m

```
1 -    n= 0:50;
2 -    w= randn(1,51);
3 -    x1= cos(0.04*pi*n)+0.01*w;
4 -    x2= cos(0.04*pi*n)+0.2*w;
5 -    x3= cos(0.04*pi*n)+2*w;
6 -    figure;
7 -    stem(n,x1);
8 -    title('0.01');
9 -    figure;
10 -   stem(n,x2);
11 -   title('0.2');
12 -   figure;
13 -   stem(n,x3);
14 -   title('2');
```



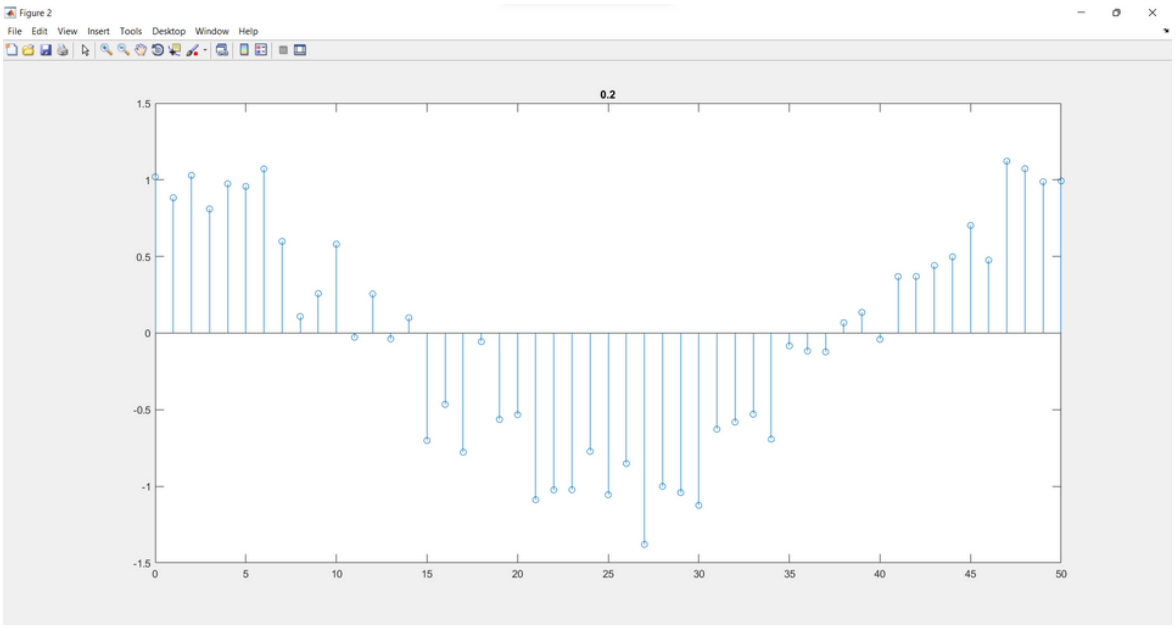


Figure 2
File Edit View Insert Tools Desktop Window Help
0.2
1.5
1
0.5
0
-0.5
-1
-1.5
0 5 10 15 20 25 30 35 40 45 50

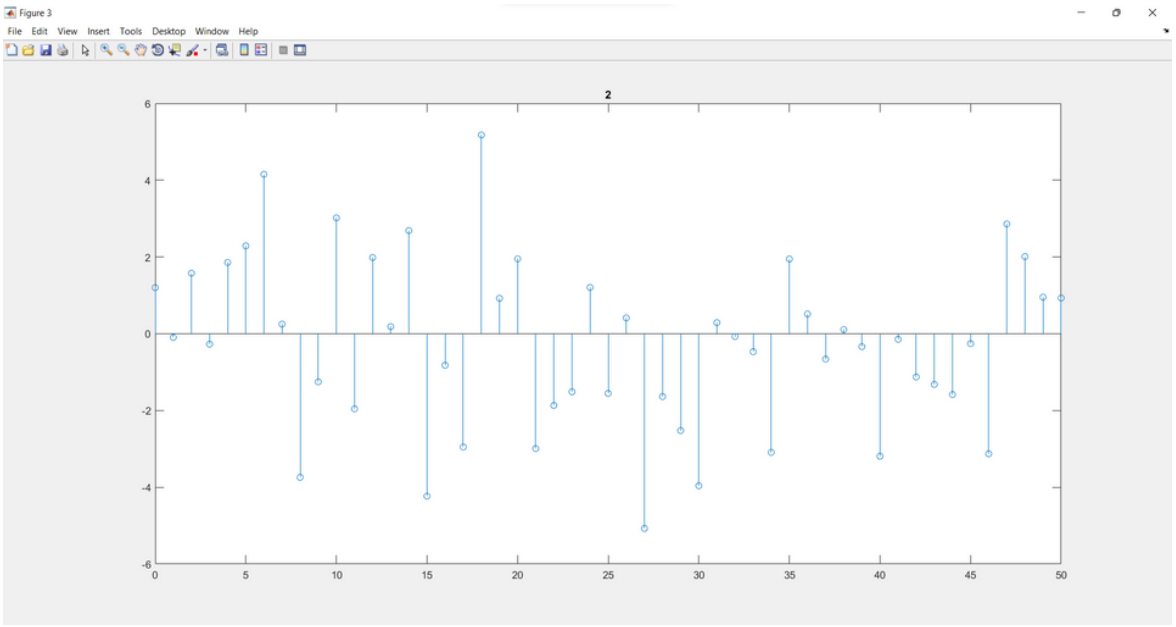


Figure 3
File Edit View Insert Tools Desktop Window Help
2
6
4
2
0
-2
-4
-6
0 5 10 15 20 25 30 35 40 45 50

QUESTION 8

```
n= -10:10;
x= exp((-0.1+0.3j)*n);
magnitude= abs(x);
phase_angle_degree= angle(x)*(180/pi);
real_part= real(x);
imaginary_part= imag(x);
subplot(2,2,1); stem(n,magnitude); title('Magnitude');xlabel('n'); ylabel('Magnitude');
subplot(2,2,2); stem(n,phase_angle_degree); title('phase angle degree');xlabel('n'); ylabel('Phase');
subplot(2,2,3); stem(n,real_part); title('Real part');xlabel('n'); ylabel('Real part');
subplot(2,2,4); stem(n,imaginary_part); title('Imaginary part');xlabel('n'); ylabel('Imaginary part');
```