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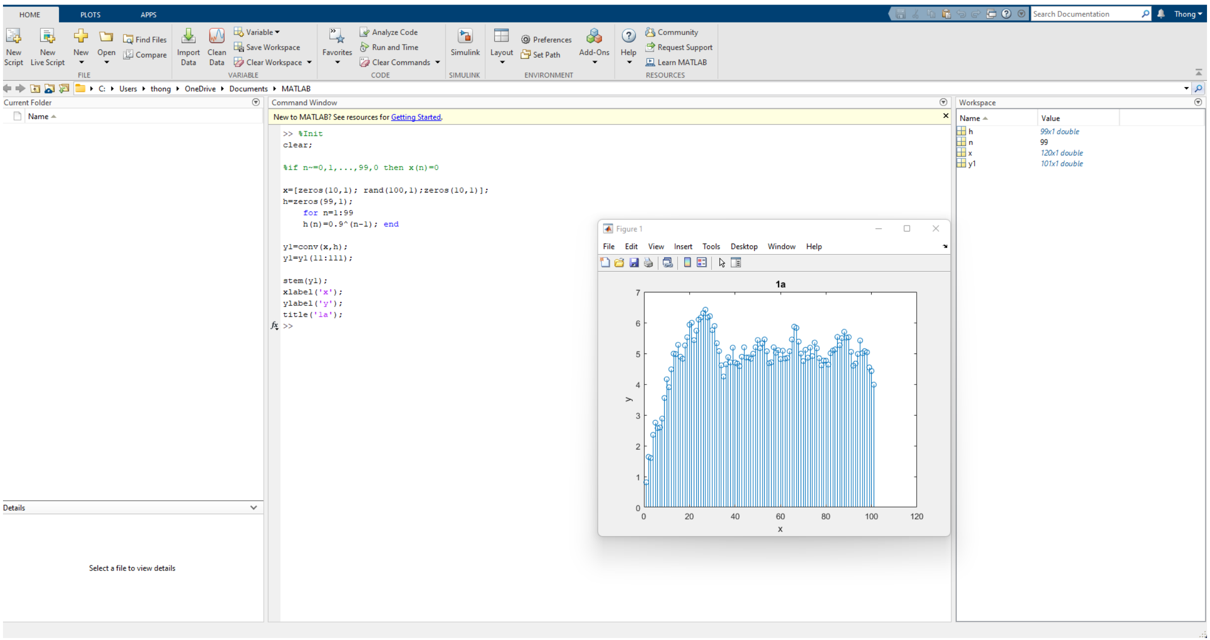
EE110B LAB 2

1)

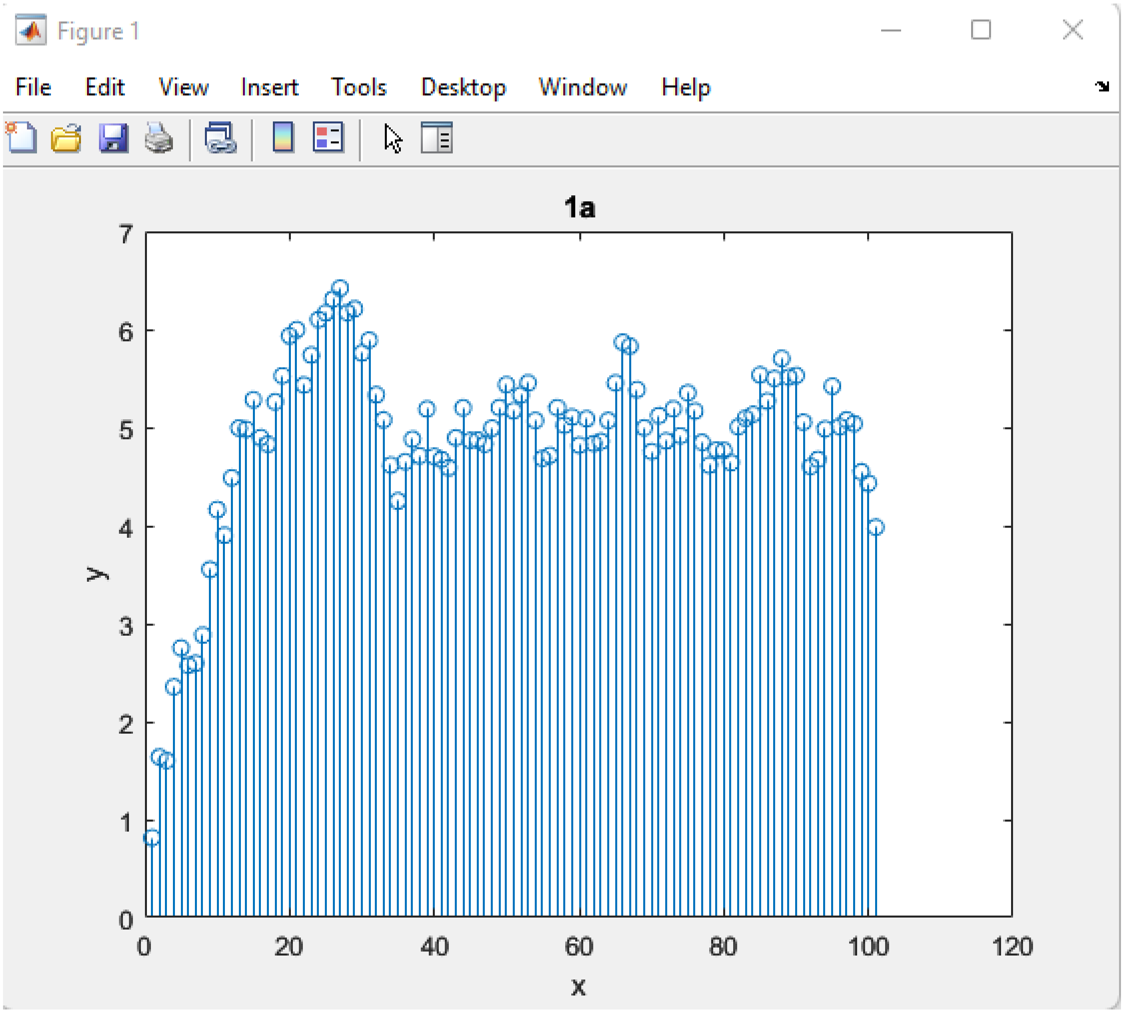
a)



For the coding part:

```
%Init
clear;

%if n~=0,1,...,99,0 then x(n)=0

x=[zeros(10,1); rand(100,1);zeros(10,1)];
h=zeros(99,1);
    for n=1:99
    h(n)=0.9^(n-1); end

y1=conv(x,h);
y1=y1(11:111);

stem(y1);
xlabel('x');
ylabel('y');
title('1a');
```

For the graphing part:



Convolution of x(n) and h(n)

b)

For the coding part:

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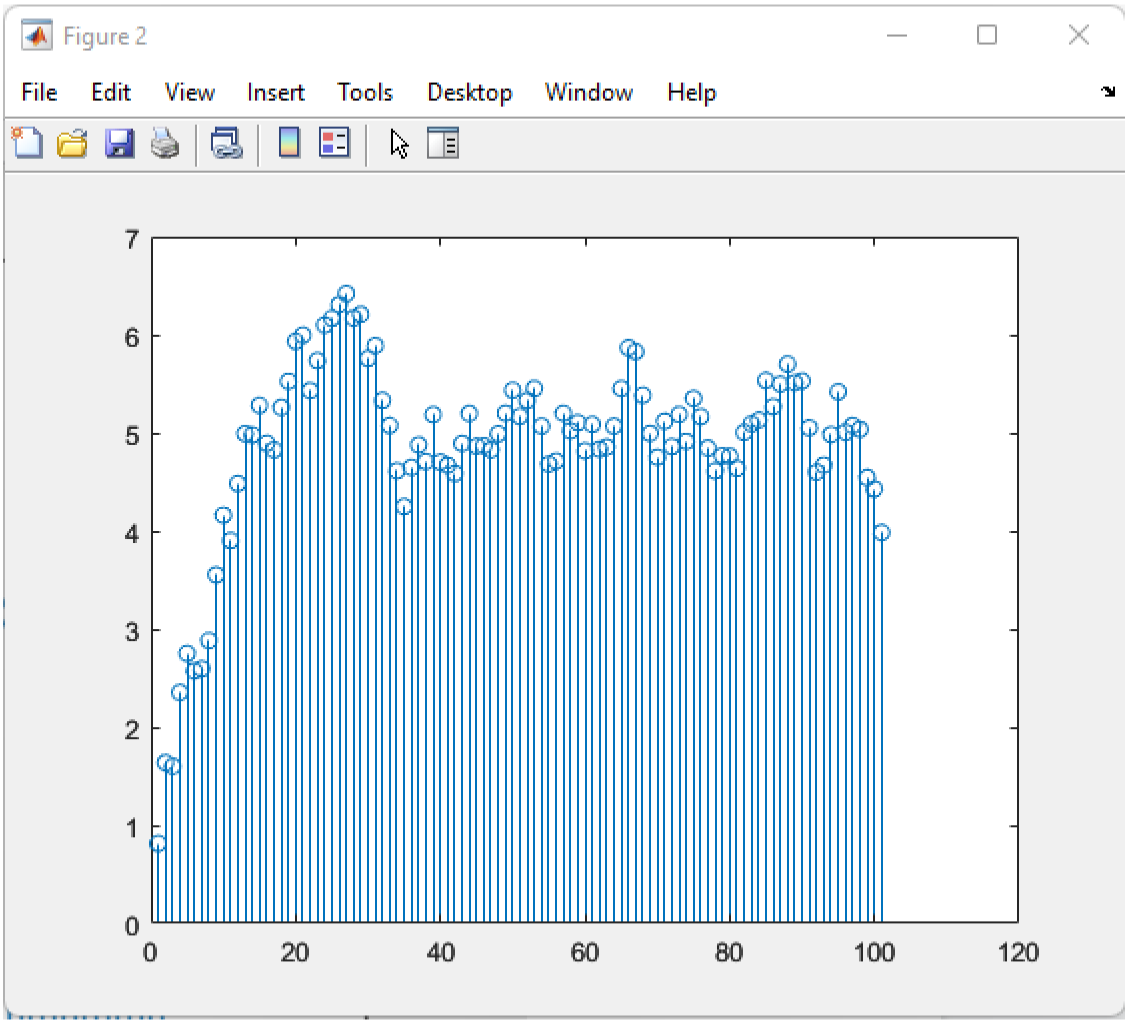
EE110B_lab2_part2a.m | lab2_part1.m

```
%Init
clear;

%if n~=0,1,...,99,0 then x(n)=0

x=[zeros(10,1); rand(100,1);zeros(10,1)];
h=zeros(99,1);
    for n=1:99
    h(n)=0.9^(n-1); end

y1=conv(x,h);
y1=y1(11:111);

stem(y1);
xlabel('x');
ylabel('y');
title('1a');
%b)
y2=zeros(102,1);
for n=1:101
    y2(n+1)=0.9*y2(n)+x(n+10)



    end
figure(2)
stem(y2(2:102));

```

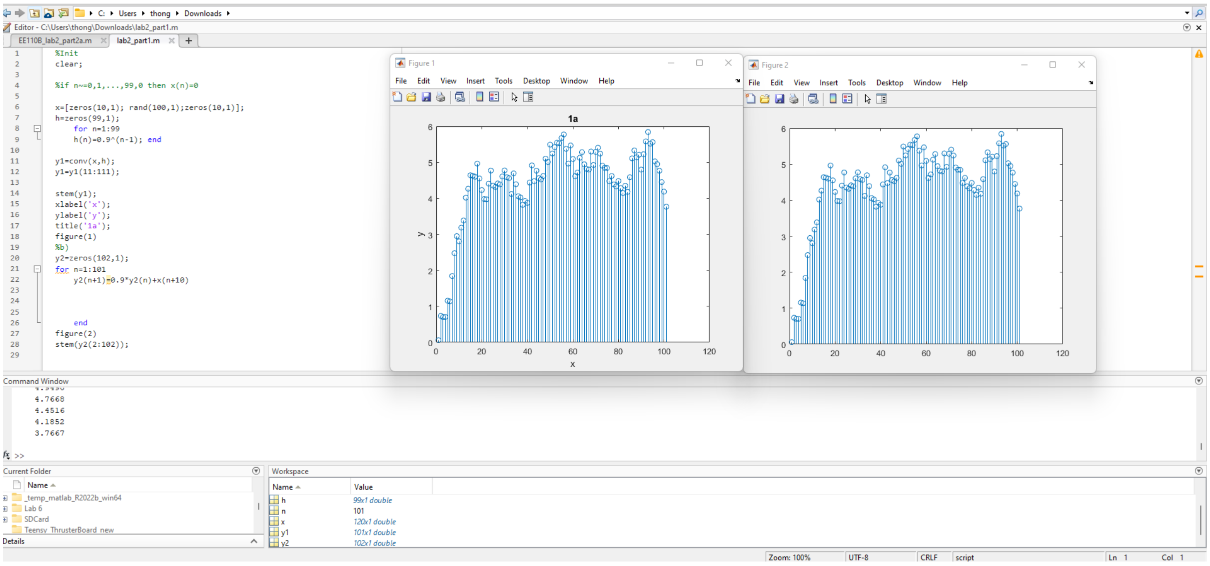
For graphing part



$y[n+1] = 0.9y[n] + x[n]$

c)

Yes, they are close to each other because by solving impulse response in problem a, and the convolution sum of two sequences x(n) and h(n) in problem b. From that, the convolution of two sequences x(n) and h(n) is equal to solving the differential equation for y(n) by the impulse of response from a . After all, we can compare that a and b are identical.


C: Users thong Downloads
Editor - C:\Users\thong\Downloads\lab2_part1.m
EE110B_lab2_part2a.m
lab2_part1.m
%Init
clear;
%if n~=0,1,...,99,0 then x(n)=0
x=[zeros(10,1); rand(100,1);zeros(10,1)];
h=zeros(99,1);
for n=1:99
h(n)=0.9^(n-1); end
y1=conv(x,h);
y1=y1(11:111);
stem(y1);
xlabel('x');
ylabel('y');
title('1a');
figure(1)
%b)
y2=zeros(102,1);
for n=1:101
y2(n+1)=0.9*y2(n)+x(n+10)
end
figure(2)
stem(y2(2:102));
Command Window
4.7668
4.5516
4.1852
3.7667
Current Folder
Workspace
Figure 1
Figure 2
1a

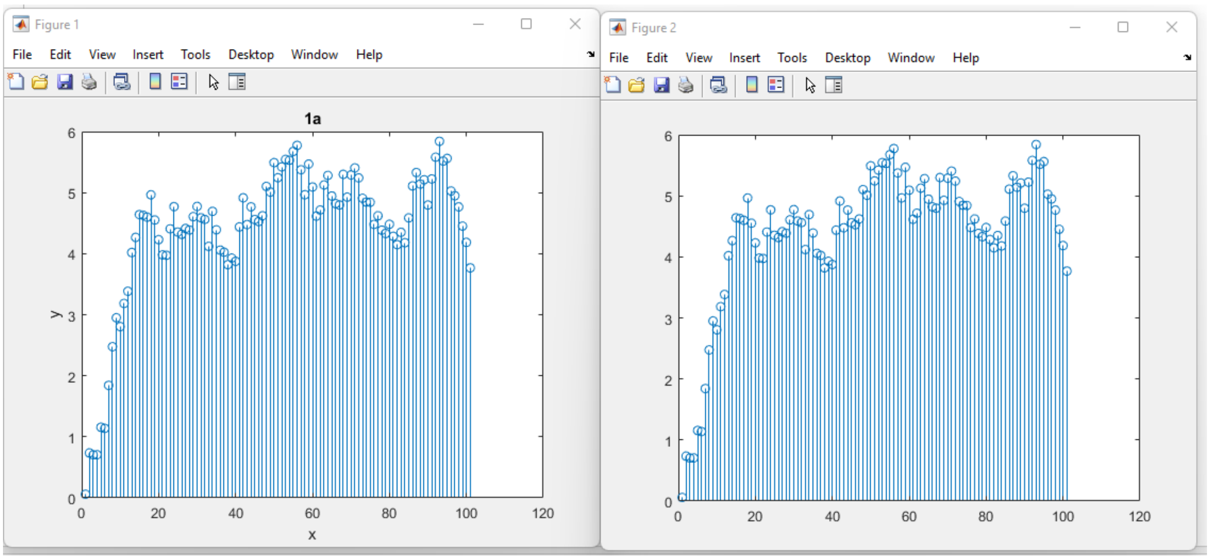
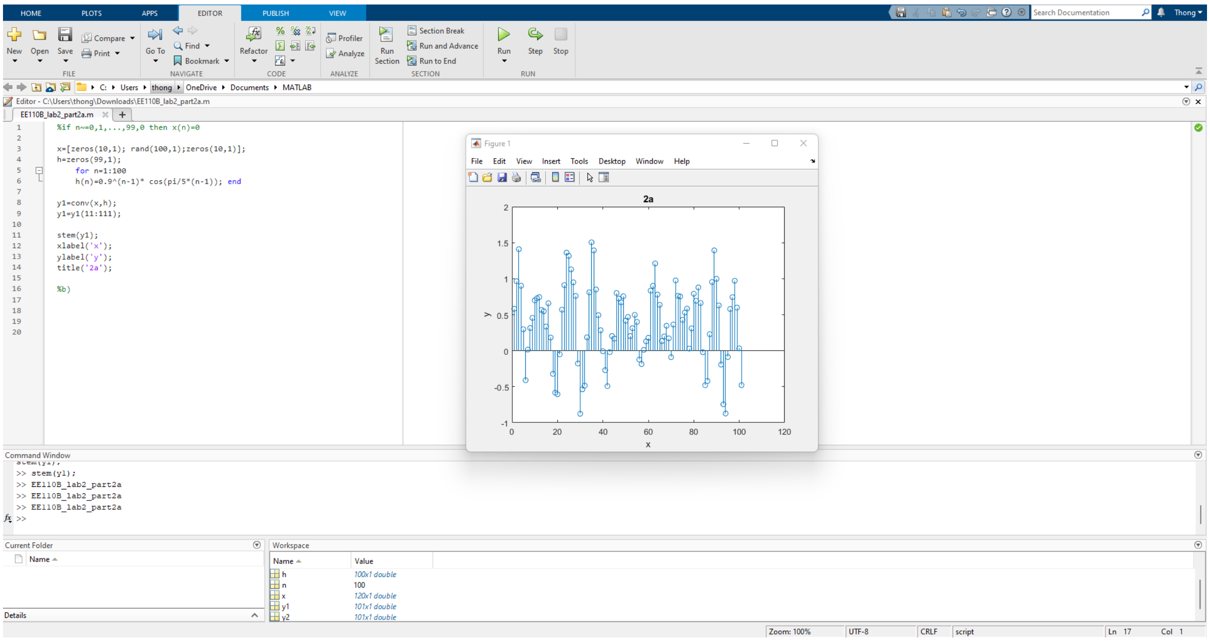


Figure 1
File Edit View Insert Tools Desktop Window Help
1a
y
x
Figure 2
File Edit View Insert Tools Desktop Window Help

2)

a)



For coding part:

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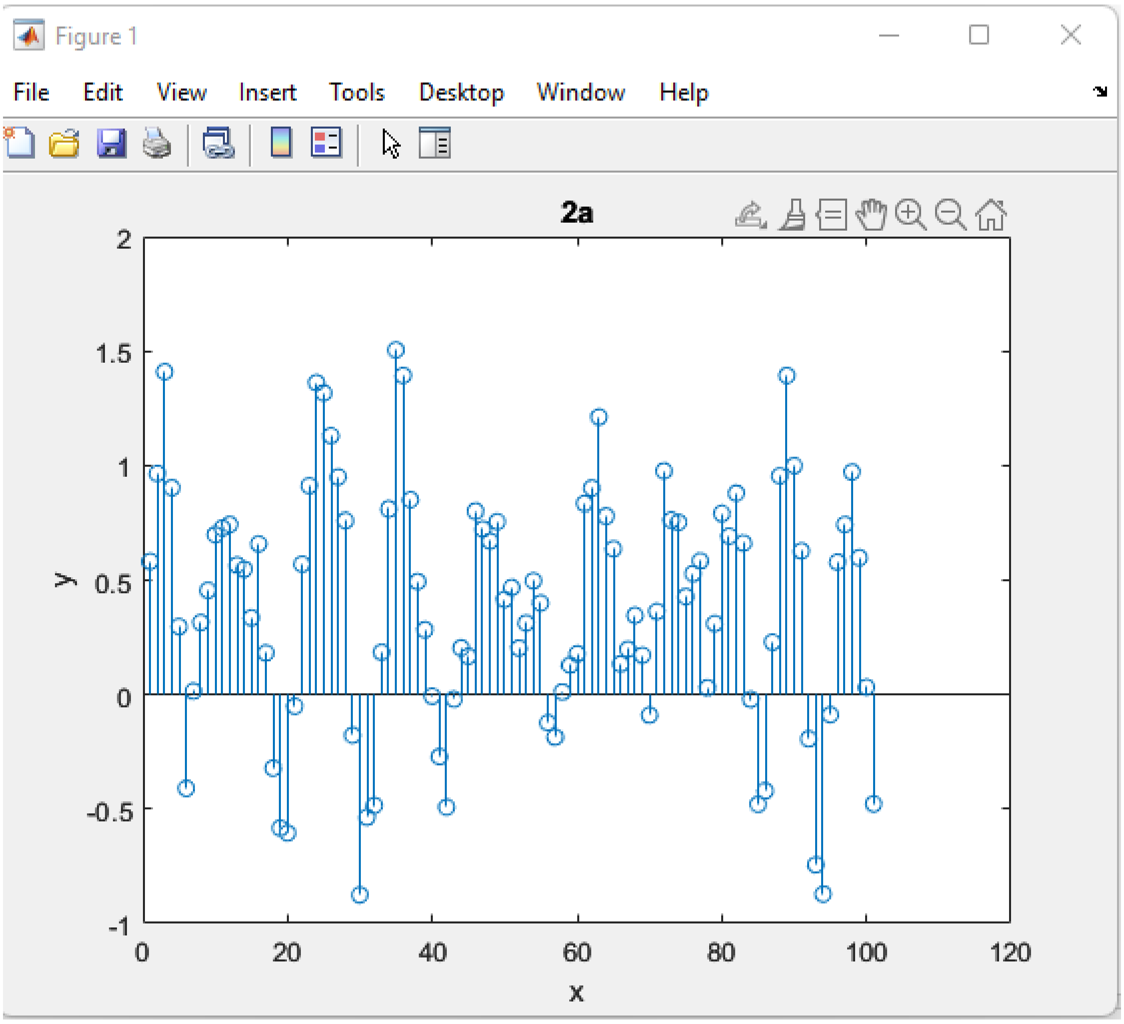
EE110B_lab2_part2a.m

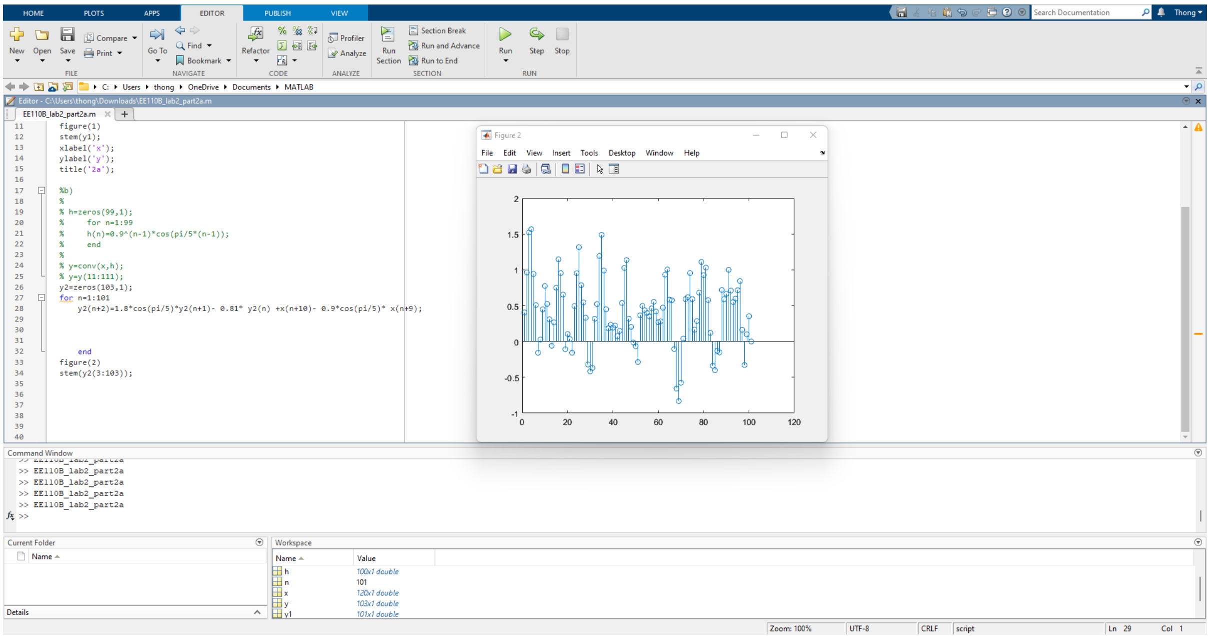
```
%if n~=0,1,...,99,0 then x(n)=0

x=[zeros(10,1); rand(100,1);zeros(10,1)];
h=zeros(100,1);
    for n=1:100
    h(n)=0.9^(n-1)* cos(pi/5*(n-1)); end

y1=conv(x,h);
y1=y1(11:111);

figure(1)
stem(y1);
xlabel('x');
ylabel('y');
title('2a');

```

For the graphing part:



h[n] = 0.9n−1cos(π5 (n−1)){u[n−1]−u[n−100]}.

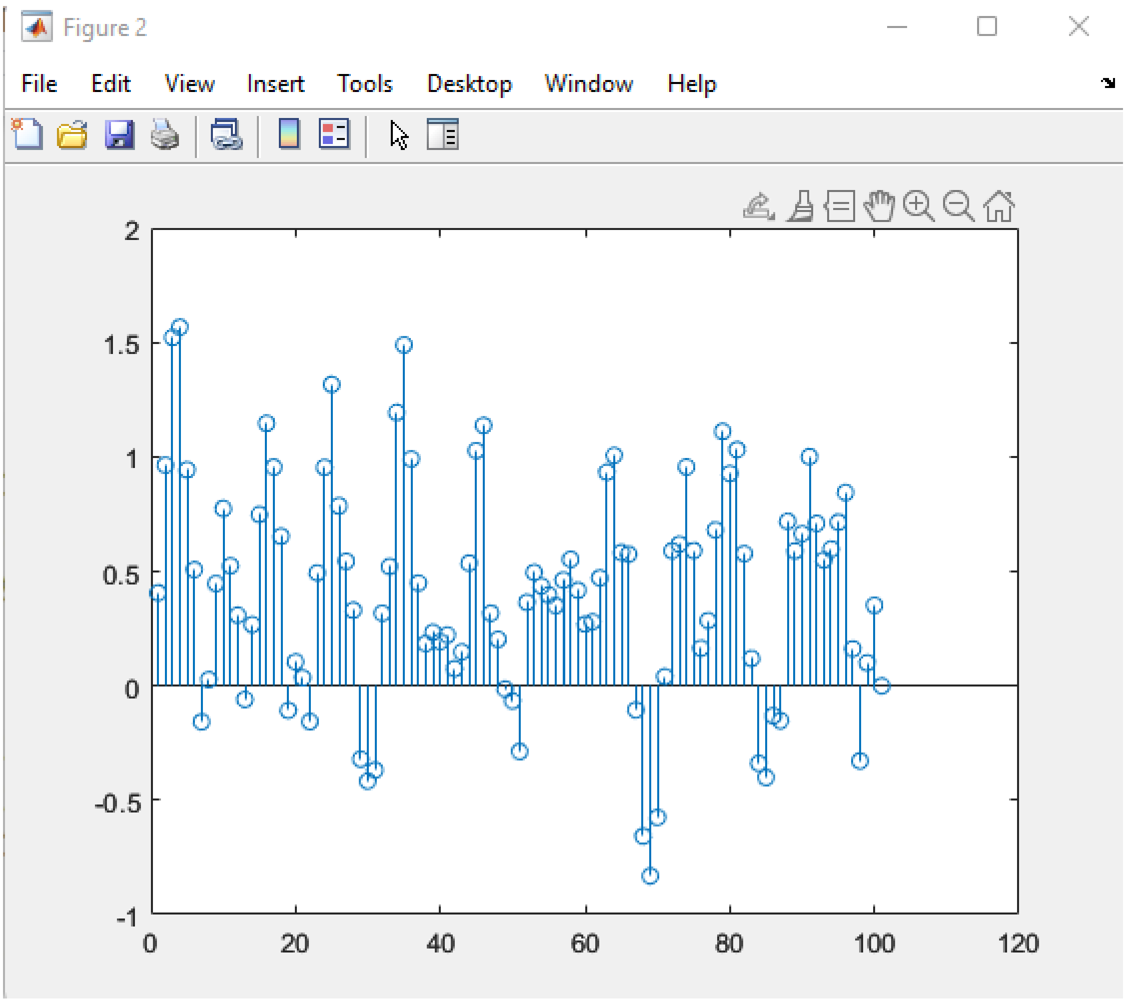
b)



Coding part:

```
%b)
%
% h=zeros(99,1);
%     for n=1:99
%     h(n)=0.9^(n-1)*cos(pi/5*(n-1));
%     end
%
% y=conv(x,h);
% y=y(11:111);
y2=zeros(103,1);
for n=1:101
    y2(n+2)=1.8*cos(pi/5)*y2(n+1)- 0.81* y2(n) +x(n+10)- 0.9*cos(pi/5)* x(n+9);



    end
figure(2)
stem(y2(3:103));
```

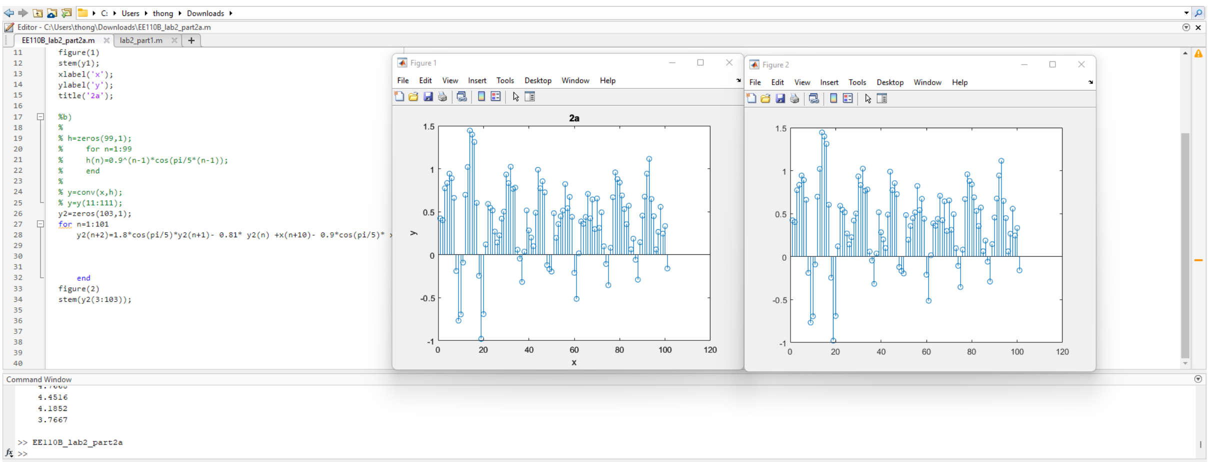
Graph part:



y[n+ 1] = 1.8 cos(π5)y[n+ 1]−0.81y[n] +x[n+ 1]−0.9 cos(π5)x[n]

c)

Yes, the graph of a and b is close to each other because the convolution of x(n) and h(n) in problem b is the same as the differential equation in problem a. From that, I can conclude that the sequences of in a and b are very close to each other.



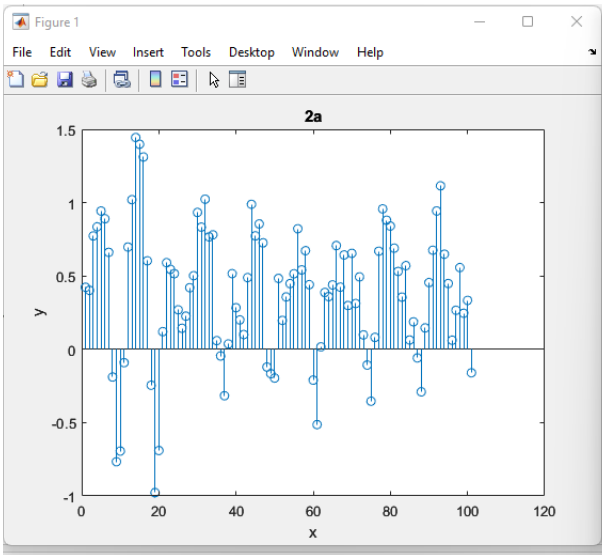


Figure 1
File
Edit
View
Insert
Tools
Desktop
Window
Help
2a
1.5
1
0.5
0
-0.5
-1
y
0
20
40
60
80
100
120
x

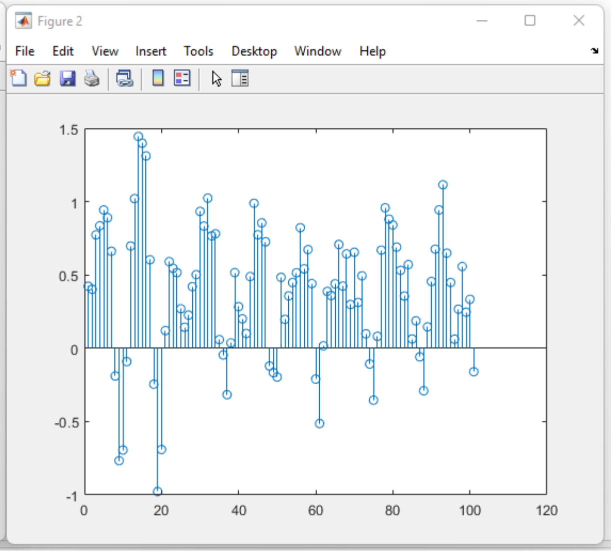


Figure 2
File
Edit
View
Insert
Tools
Desktop
Window
Help
1.5
1
0.5
0
-0.5
-1
0
20
40
60
80
100
120