

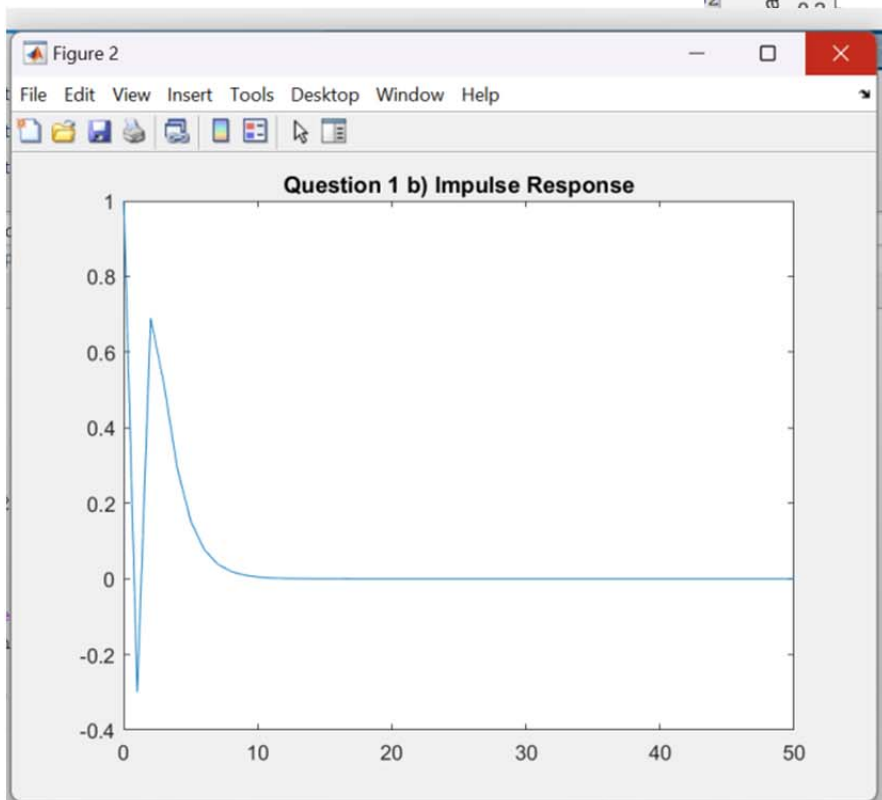
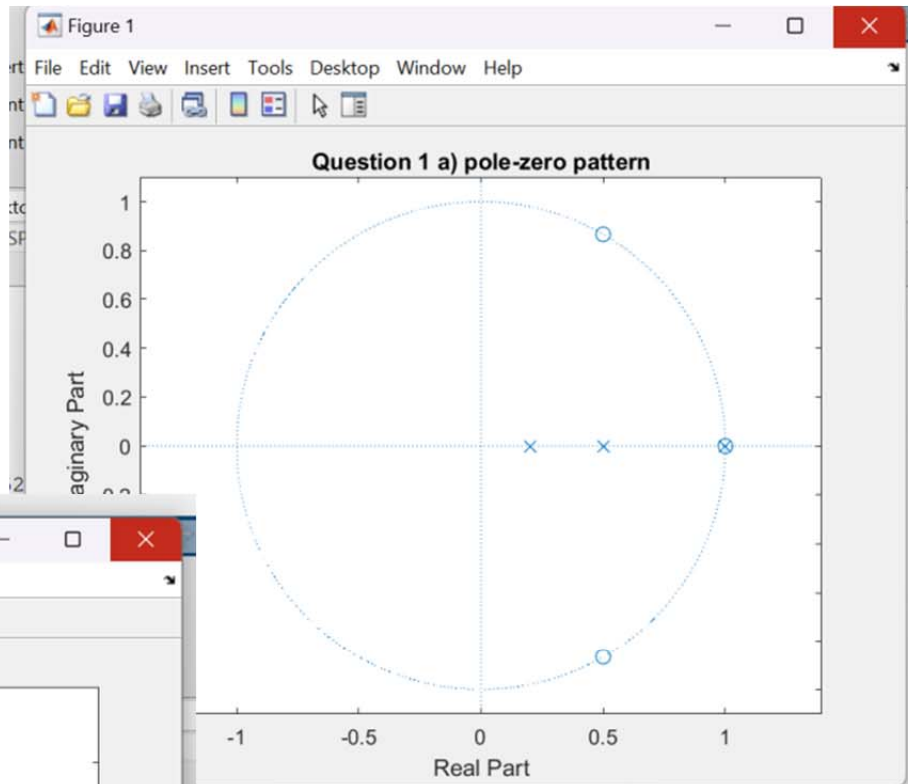
Lab 3 DSP

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Question 1:

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Lab3DSP.m* X +
1 %Assignment Lab 3
2 %Question 1:
3 b1 = [1 -2 2 -1];
4 a1 = poly([1 0.5 0.2]);
5 H = tf(b1,a1);
6 pzmap(H);
7 zplane(b1,a1)
8 title('Question 1 a) pole-zero pattern');
9 %The system is stable
10 syms z
11 H = (1-2*z^-1+2*z^-2-z^-3)/((1-z^-1)*(1-0.5*z^-1)*(1-0.2*z^-1));
12 n = [0:50];
13 figure;
14 h=iztrans(H,n);
15 plot(n,h)
16 % figure;
17 % impz(b,a)
18 title('Question 1 b) Impulse Response');
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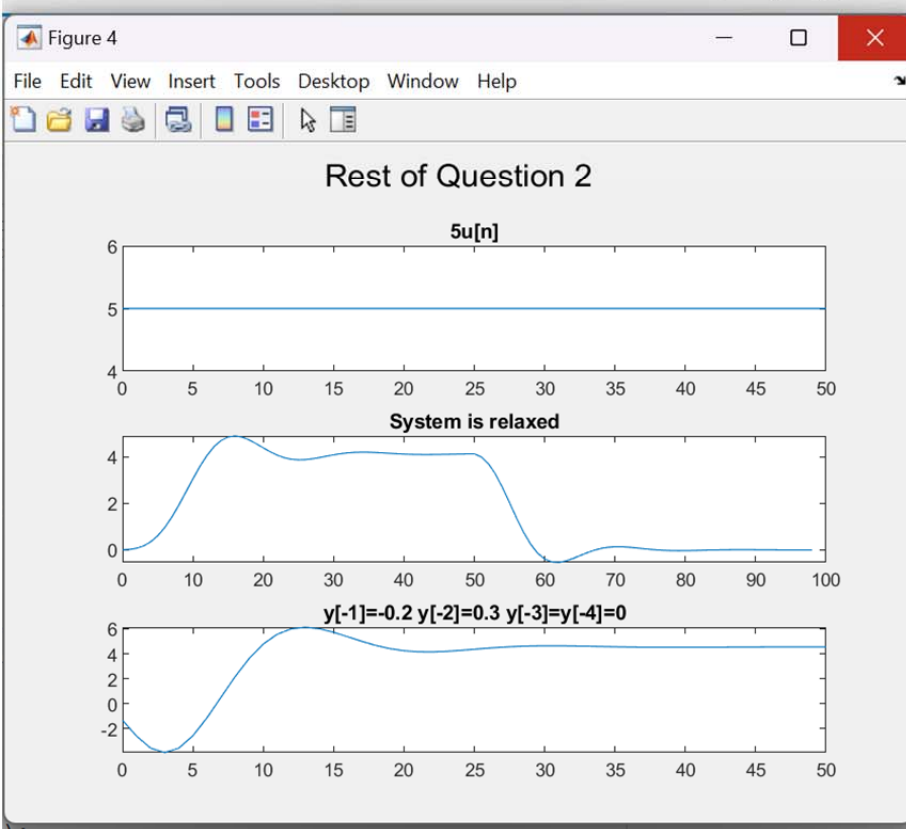
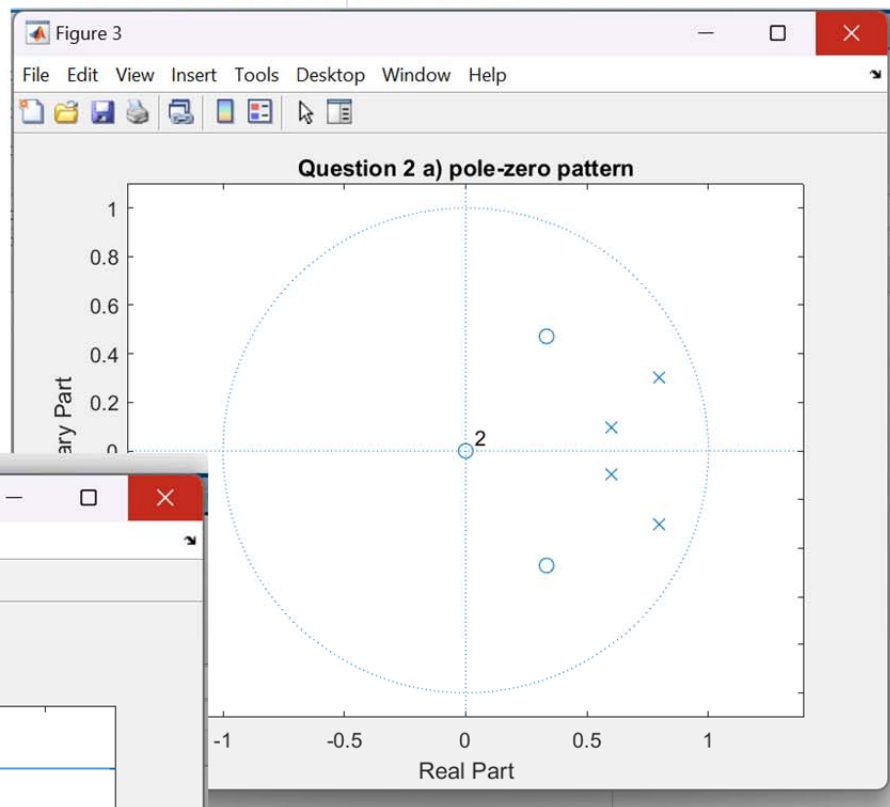
Question 2:

Lab3DSP.m

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21 %Question 2:
22 b2 = [0.03 -0.02 0.01];
23 a2 = [1 -2.8 3.02 -1.468 0.27];
24 figure; zplane(b2,a2); title('Question 2 a) pole-zero pattern');
25 %The system is stable
26 w = [0:1:500]*pi/500;
27 H2=freqz(b2,a2,w);
28 % figure;% subplot(2,1,1); plot(w/pi,abs(H2)); title('Magnitude Response');
29 % subplot(2,1,2); plot(w/pi,angle(H2)*180/pi); title('Phase Response');
30 figure;
31 n = [0:50];
32 x = [5*ones(1,51)];
33 subplot(3,1,1); plot(n,x); sgtitle('Rest of Question 2'); title('5u[n]');
34 i = [1 zeros(1,48)];
35 h = filter(b2,a2,i);
36 xf =filter(b2,a2,x);
37 y2 = conv(h,xf);
38 subplot(3,1,2); plot([0:length(y2)-1],y2); title('System is relaxed');
39 y3=[-0.2 0.3 0 0];
40 xic = filtic(b2,a2,y3);
41 k =filter(b2,a2,x,xic);
42 subplot(3,1,3); plot([0:length(k)-1],k); title('y[-1]=-0.2 y[-2]=0.3 y[-3]=y[-4]=0');

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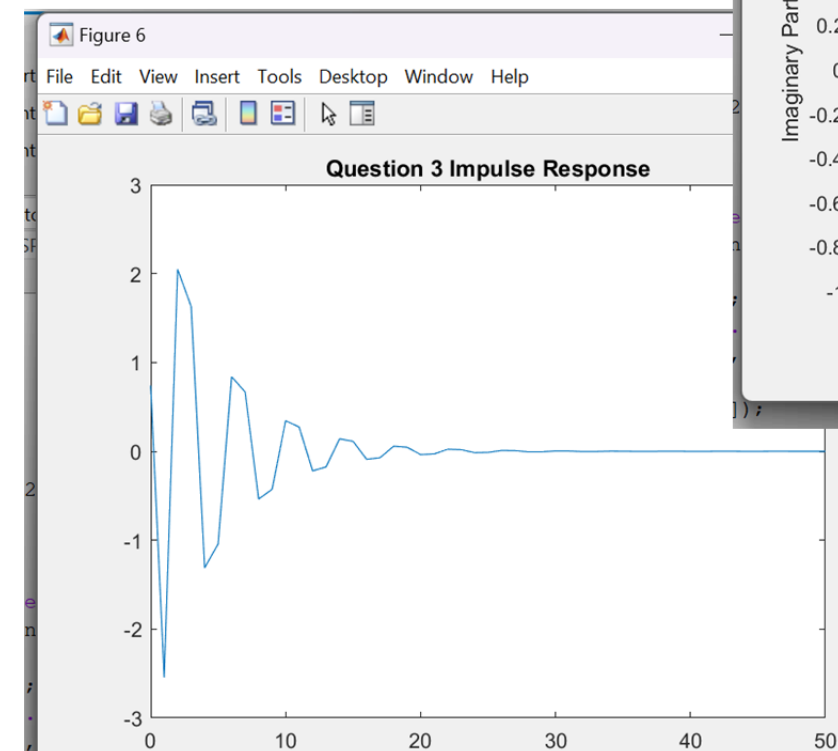
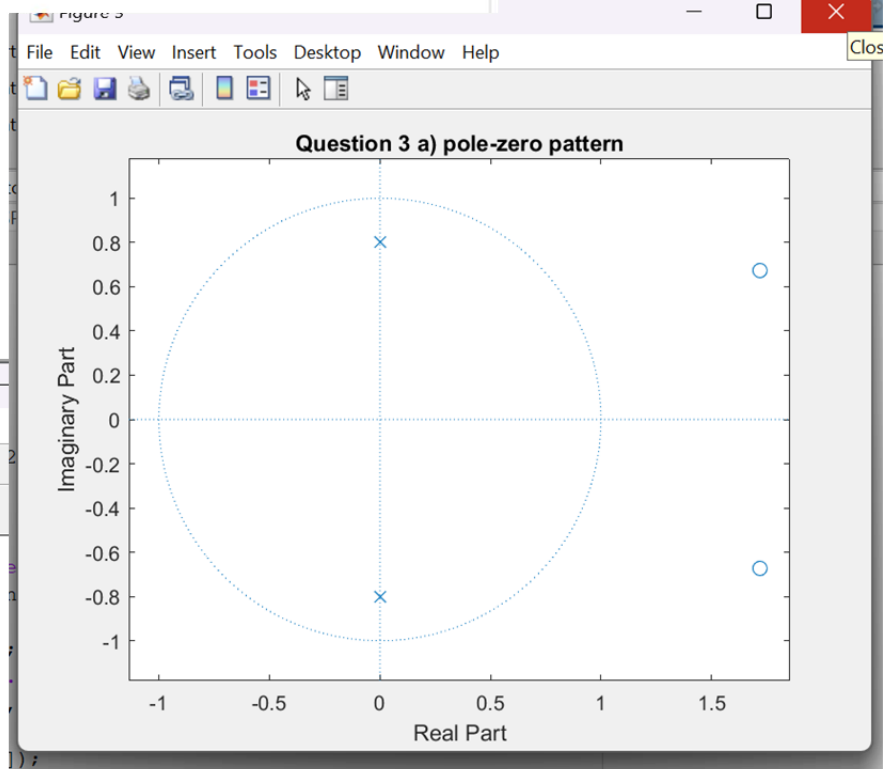


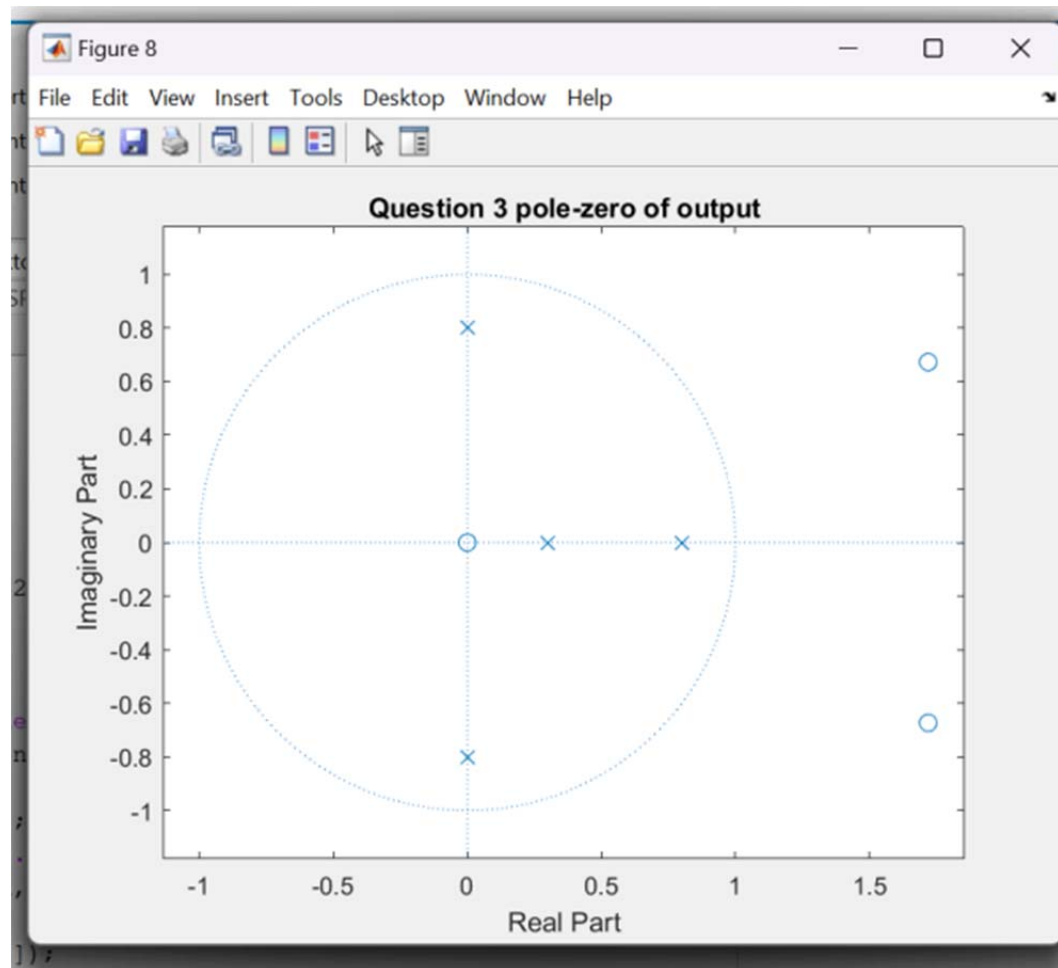
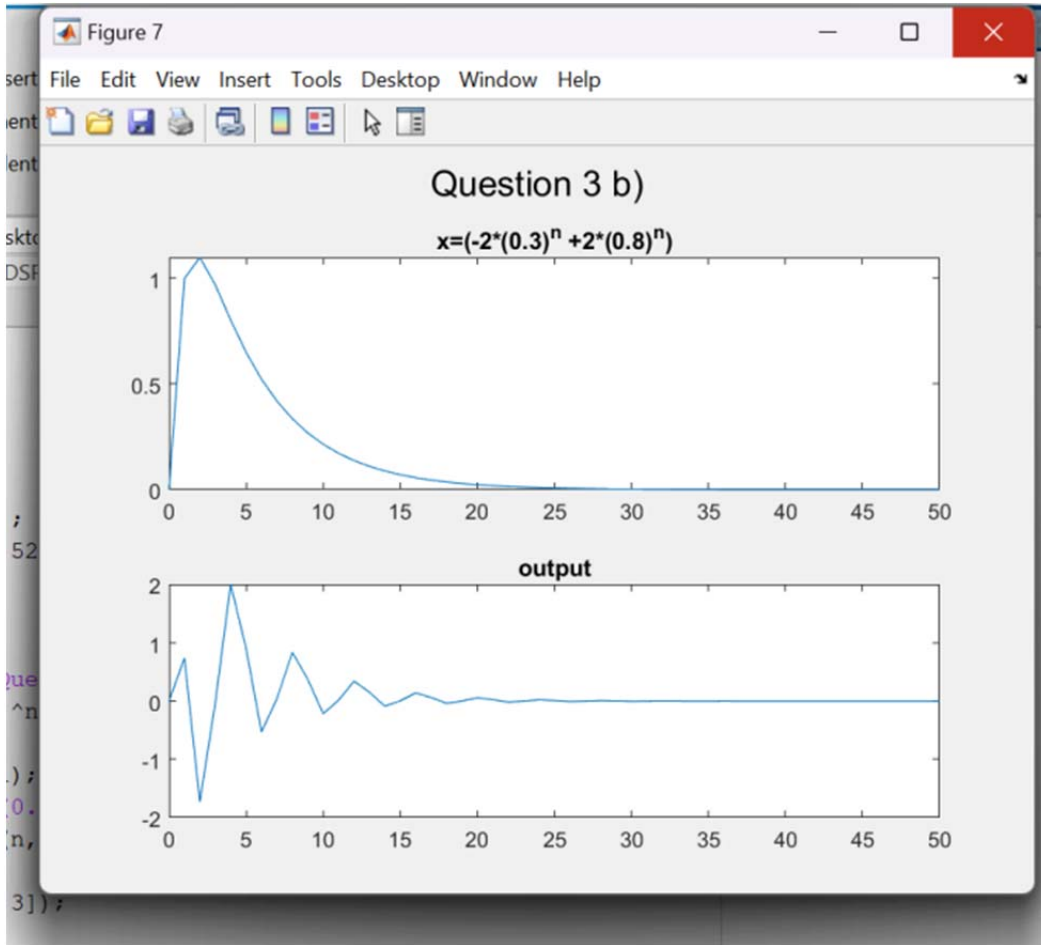
Question 3:

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46 %Question 3:
47 b3=[0.74 -2.544 2.5216];
48 a3=[1 0 0.64];
49 figure; zplane(b3,a3); title('Question 3 a) pole-zero pattern');
50 H3 = (0.74*z^2-2.544*z+2.5216)/(z^2+0.64);
51 n = [0:50];
52 figure;
53 h=iztrans(H3,n);
54 plot(n,h); title('Question 3 Impulse Response');
55 x3=(-2*(0.3).^n +2*(0.8).^n);
56 y3=filter(b3,a3,x3);
57 figure; subplot(2,1,1); plot(n,x3); sgtitle('Question 3 b)');
58 title('x=(-2*(0.3)^n +2*(0.8)^n)');
59 subplot(2,1,2); plot(n,y3); title('output');
60 figure;
61 a4 = conv([1 -0.8],[1 -0.3]);
62 a = conv(a3,a4);
63 b = conv(b3,[0 1]);
64 zplane(b,a); title('Question 3 pole-zero of output');
65

```





Code:

```
%Assignment Lab 3
%Question 1:
b1 = [1 -2 2 -1];
a1 = poly([1 0.5 0.2]);
H = tf(b1,a1);
pzmap(H);
zplane(b1,a1)
title('Question 1 a) pole-zero pattern');
%The system is stable
syms z
H = (1-2*z^-1+2*z^-2-z^-3)/((1-z^-1)*(1-0.5*z^-1)*(1-0.2*z^-1));
n = [0:50];
figure;
h=iztrans(H,n);
plot(n,h)
% figure;
% impz(b,a)
title('Question 1 b) Impulse Response');

%Question 2:
b2 = [0.03 -0.02 0.01];
a2 = [1 -2.8 3.02 -1.468 0.27];
figure; zplane(b2,a2);
title('Question 2 a) pole-zero pattern');
%The system is stable
w = [0:1:500]*pi/500;
H2=freqz(b2,a2,w);
% figure; subplot(2,1,1); plot(w/pi,abs(H2));
title('Magnitude Response');
% subplot(2,1,2); plot(w/pi,angle(H2)*180/pi);
title('Phase Response');
figure;
n = [0:50];
x =[5*ones(1,51)];
subplot(3,1,1); plot(n,x);
sgtitle('Rest of Question 2'); title('5u[n]');
i = [1 zeros(1,48)];
h = filter(b2,a2,i);
```

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xf =filter(b2,a2,x);
y2 = conv(h,xf);
subplot(3,1,2);      plot([0:length(y2)-1],y2);
title('System is relaxed');
y3=[-0.2 0.3 0 0];
xic = filtic(b2,a2,y3);
k =filter(b2,a2,x,xic);
subplot(3,1,3);      plot([0:length(k)-1],k);
title('y[-1]=-0.2 y[-2]=0.3 y[-3]=y[-4]=0');

```

%Question 3:

```

b3=[0.74 -2.544 2.5216];
a3=[1 0 0.64];
figure;      zplane(b3,a3);
title('Question 3 a) pole-zero pattern');
H3 = (0.74*z^2-2.544*z+2.5216)/(z^2+0.64);
n = [0:50];
figure;
h=iztrans(H3,n);
plot(n,h);      title('Question 3 Impulse Response');
x3=(-2*(0.3).^n +2*(0.8).^n);
y3=filter(b3,a3,x3);
figure;      subplot(2,1,1);      plot(n,x3);
sgtitle('Question 3 b)');
title('x=(-2*(0.3)^n +2*(0.8)^n)');
subplot(2,1,2);      plot(n,y3);      title('output');
figure;
a4 = conv([1 -0.8],[1 -0.3]);
a = conv(a3,a4);
b = conv(b3,[0 1]);
zplane(b,a);
title('Question 3 pole-zero of output');

```