ECE 340 Matlab Session (Codes & Plots)

```
x=-4

x =

    -4

y=j*2

y =

        0 + 2.0000i

z=x+y

z =

  -4.0000 + 2.0000i

plot(z,'*')
axis([-5 2 -3 3])
grid
[za,zm]=cart2pol(-4,2)

za =

    2.6779


zm =

    4.4721

zad=(180/pi)*za, % Angle of z in degrees.

zad =

  153.4349

zx=real(z)

zx =

    -4

zy=imag(z)

zy =

     2
```

```
[x2,y2]=pol2cart((pi/3),5)

x2 =

    2.5000


y2 =

    4.3301

exp(-5)

ans =

    0.0067

z1=[1,2,3,4]

z1 =

     1     2     3     4

z2=[5,6,7,8]

z2 =

     5     6     7     8

y4=z1.*z2

y4 =

     5    12    21    32

sum(y4)

ans =

    70

Ts=0.03,Tend=8,

Ts =

    0.0300


Tend =

     8
```

```
time=0:Ts:Tend;
help play2
  play2.m
  Have Fun!
  M-file to display three separate plots.
  One plot is a cosine, another plot is an exponential decay,
  and the third plot is a combination of the two which yields
  an exponentially damped, cosine waveform.

uiopen('C:\Users\Tharp\Documents\MATLAB\340\s2013\play2.m',1)
play2
u_step=inline('t>=0','t')

u_step =

     Inline function:
     u_step(t) = t>=0

t2=-2:0.01:2;
figure
plot(t2,u_step(t2))
axis([-2 2 -0.5 1.5])
tri_it=inline('(t-2).*((t>=2)&(t<=4))','t')

tri_it =

     Inline function:
     tri_it(t) = (t-2).*((t>=2)&(t<=4))

figure
plot(time,tri_it(time))
num=[1,4],den=[1,6,5]

num =

     1     4


den =

     1     6     5

[r,p,k]=residue(num,den)

r =

    0.2500
    0.7500


p =
```

```
     -5
     -1


k =

      []

sys1=tf(num,den)

Transfer function:
     s + 4
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s^2 + 6 s + 5

figure
impulse(sys1)
figure
bode(sys1)
diary off
```

Figure 1: (Cosine Waveform)

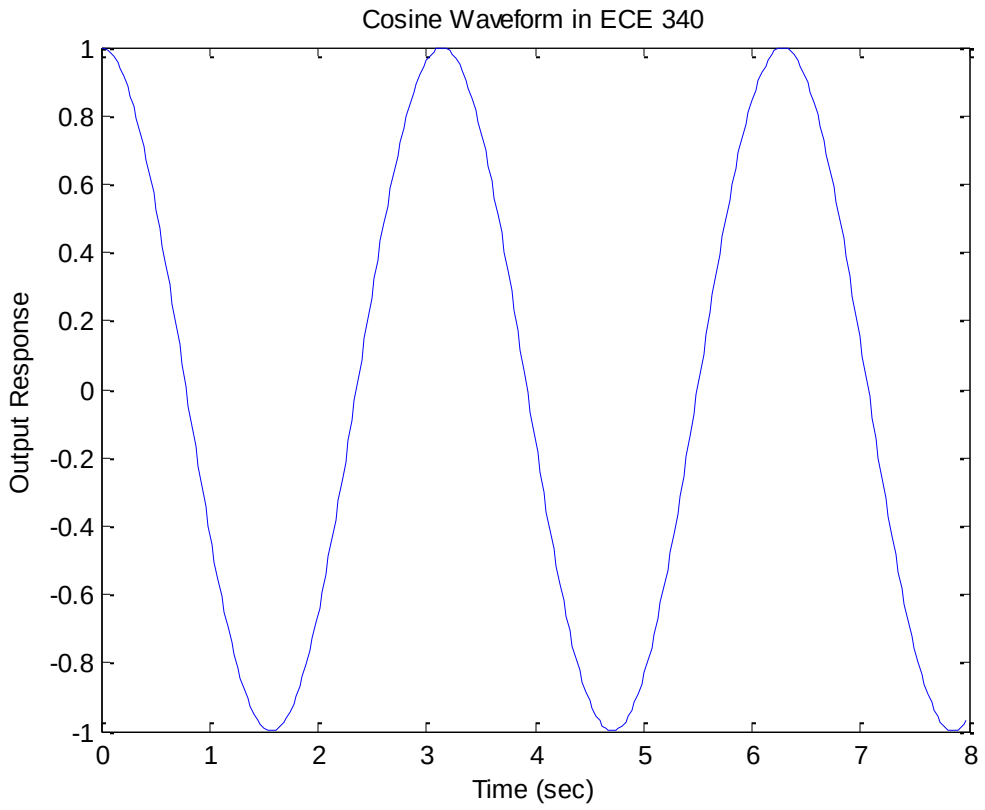


Figure 2 (Exponential Decay)

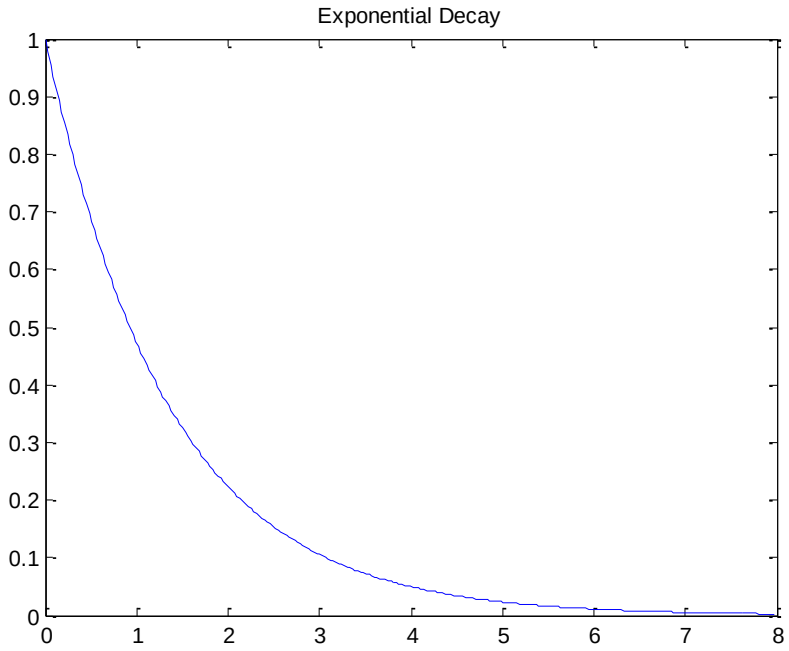


Figure 3 (Exponentially Damped Cosine)

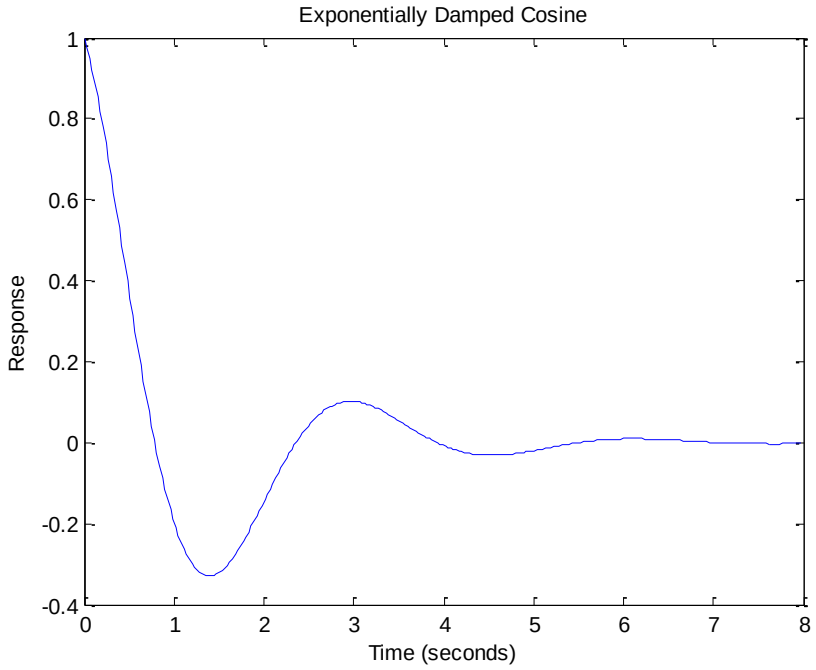


Figure 4 (Unit Step Waveform created from an inline function)

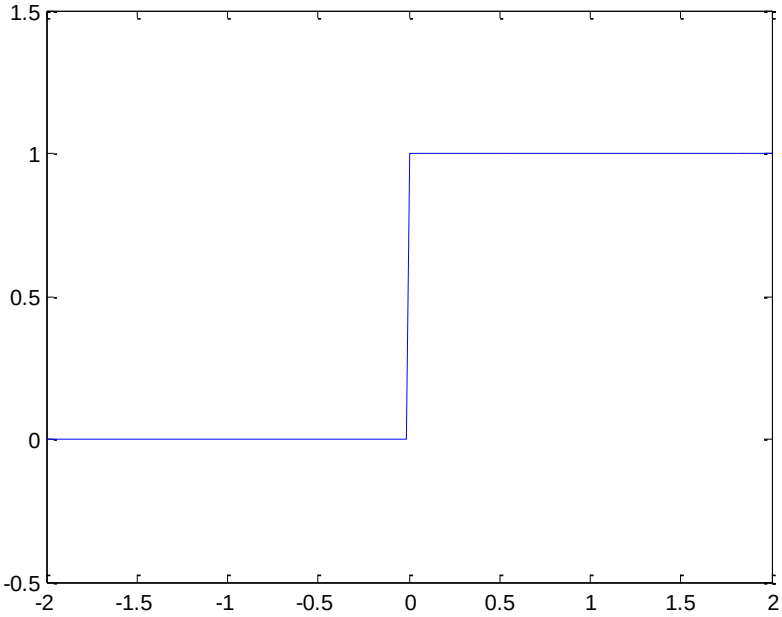


Figure 5 (Triangle Waveform or straight-line function over a limited region via an inline function)

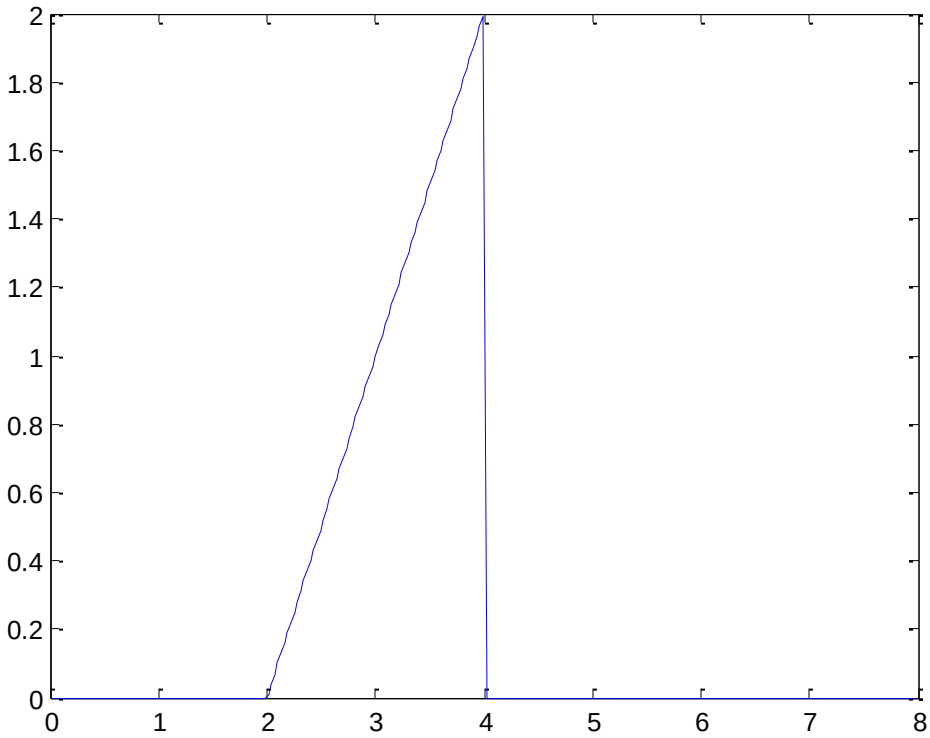


Figure 6 (Impulse Response from a given Transfer Function, Second-order (2 pole & 1 zero))

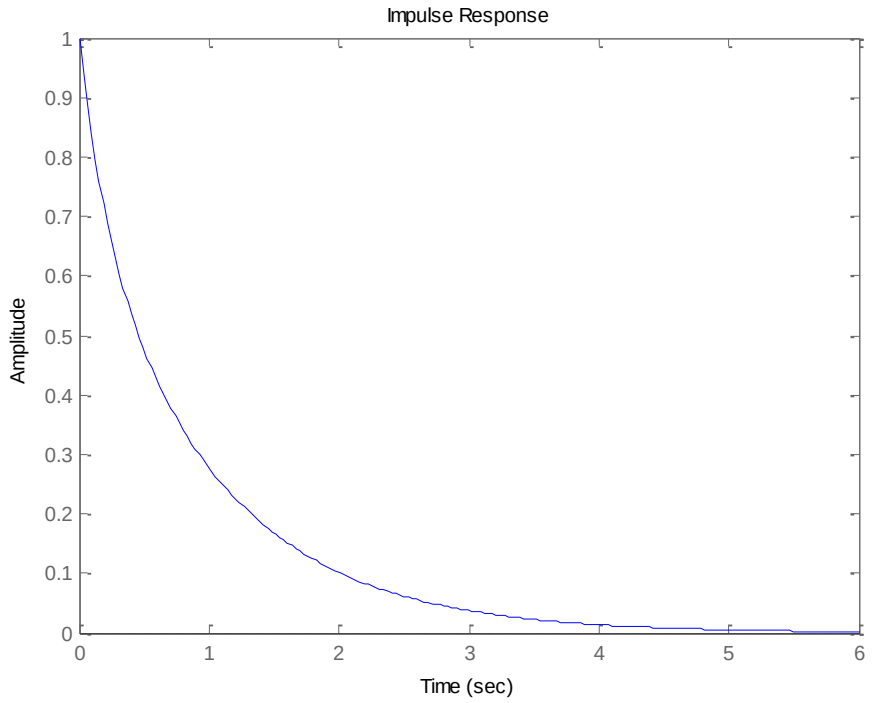
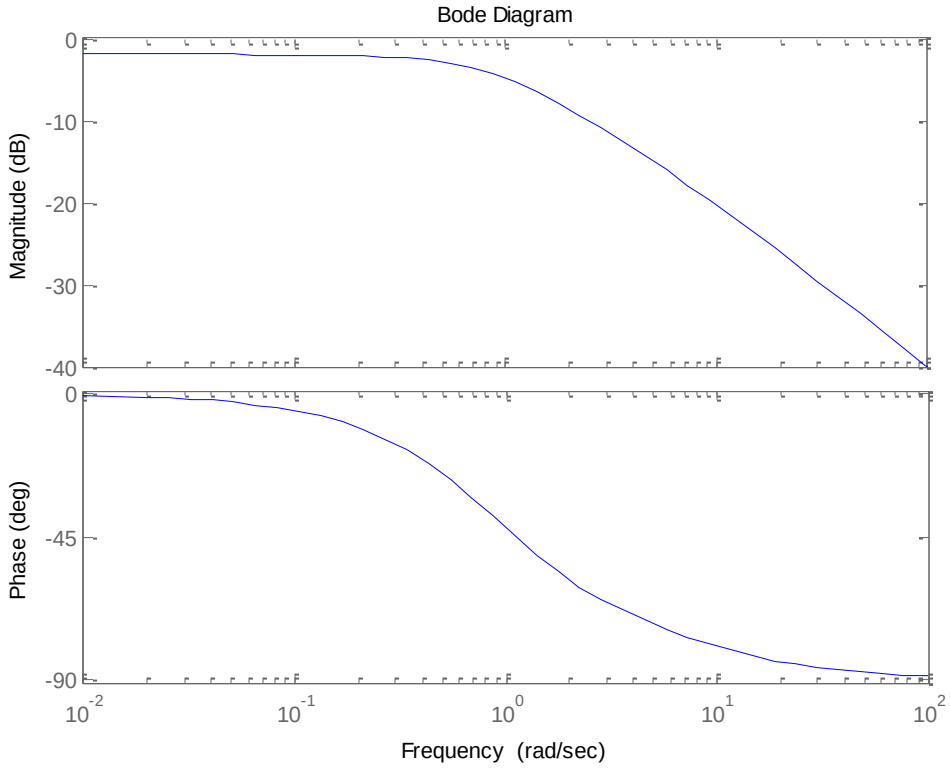


Figure 7 (Bode Plot of the same second-order transfer function from Figure 6)



Code for the ‘play2.m’ M-file:

```
% play2.m
% Have Fun!
% M-file to display three separate plots.
% One plot is a cosine, another plot is an exponential decay,
% and the third plot is a combination of the two which yields
% an exponentially damped, cosine waveform.
Ts=0.03;Tend=8;
time=0:Ts:Tend;
y1=cos(2*time); % Cosine waveform w/ angular frequency of 2 radians/sec.
figure(1)
plot(time,y1)
xlabel('Time (sec)')
ylabel('Output Response')
title('Cosine Waveform in ECE 340')
y2=exp(-(3/4)*time); % Exponential Decay (time constant of (4/3 seconds))
figure(2)
plot(time,y2)
title('Exponential Decay')
% Combine the cosine w/ exp decay
y3=y1.*y2; % Use an element-by-element product.
figure(3)
plot(time,y3)
title('Exponentially Damped Cosine') % Title the plot in the third window.
xlabel('Time (seconds)') % Provide a label for the x-axis.
ylabel('Response') % Label the y-axis.
```