FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

ENEE2312

SIGNAL AND SYSTEM –EE2312

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- Section : 3.
- Date : 22/6/2023 .

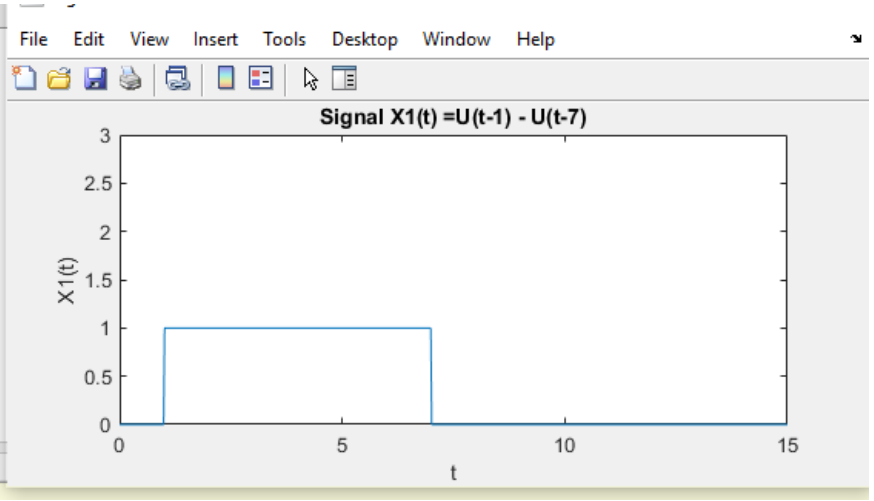
Question 1

A :

Q1_a.m

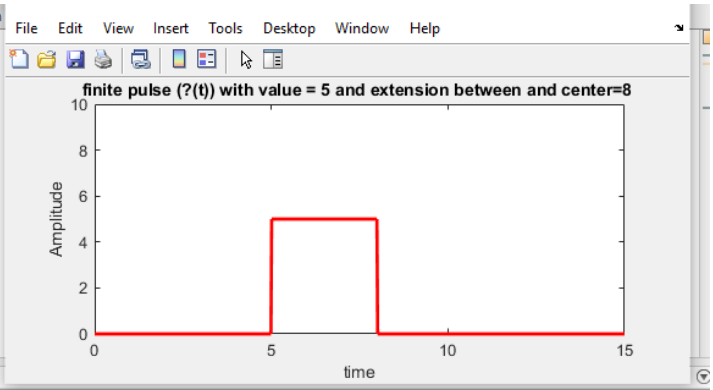
```
%Abdelrhman abed 1193191

X1 = heaviside(t-1) - heaviside(t-7);
plot(t,X1);
xlabel('t');
ylabel('X1(t)');
title('Signal X1(t) =U(t-1) - U(t-7)');

axis([0 15 0 3])
```

Command Window



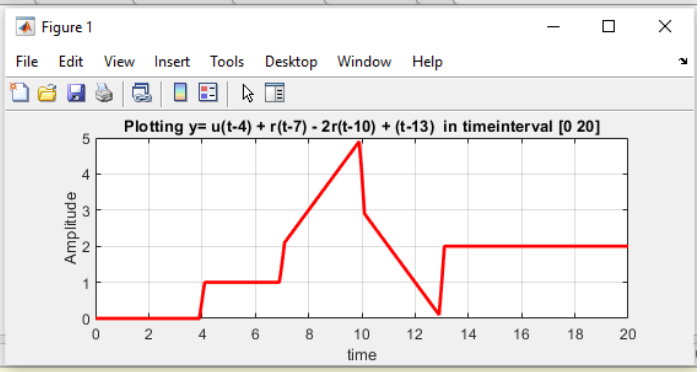
B :

```
y1=heaviside(t-5)
y2=heaviside(t-8)

x=5*(y1-y2)

plot(t,x,'r','LineWidth',2)
xlabel('time')
ylabel('Amplitude')
title('finite pulse (?(t)) with value = 5 and extension between and center=8 ')

axis([0 15 0 10])
```



C:

```
t=0.0:0.1:22
u1=heaviside(t-4)
r1=(t-6).*heaviside(t-7)
r2=(t-9).*heaviside(t-10)
r3=(t-11).*heaviside(t-13)

y1= u1 + r1 - 2*r2 + r3

plot(t,y1,'r','LineWidth',2)
xlabel('time')
ylabel('Amplitude')
title('Plotting y= u(t-4) + r(t-7) - 2r(t-10) + (t-13)  in timeinterval [0 20]')
axis([0 20 0 5])
grid on
```



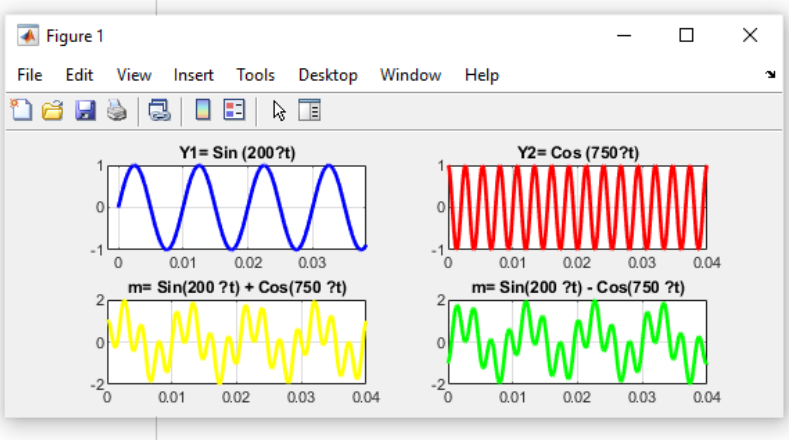

```
Columns 196 through 210
```

Question 2

A :

Q2_a.m | Q3_a.m | Q3_b.m | Q4_a.m | Q4_b.m | Q6.m | Q7_a.m | Q7_b.m | Q8_a.m | Q8_b.m | Q10.m | Q11.m

```
t=0:0.0001:0.04
y1=sin(200*pi*t)
y2=cos(750*pi*t)

m=y1+y2
n=y1-y2
%plote y1(t)
subplot(2,2,1)
plot(t,y1,'b','LineWidth',2)
title('Y1= Sin (200?t)')
grid on
%plote y2(t)
subplot(2,2,2)
plot(t,y2,'r','LineWidth',2)
title('Y2= Cos (750?t)')
grid on
%plote m(t)
subplot(2,2,3)
plot(t,m,'y','LineWidth',2)
title('m= Sin(200 ?t) + Cos(750 ?t)')
grid on
%plote n(t)
subplot(2,2,4)
plot(t,n,'g','LineWidth',2)
title('m= Sin(200 ?t) - Cos(750 ?t)')
grid on
```

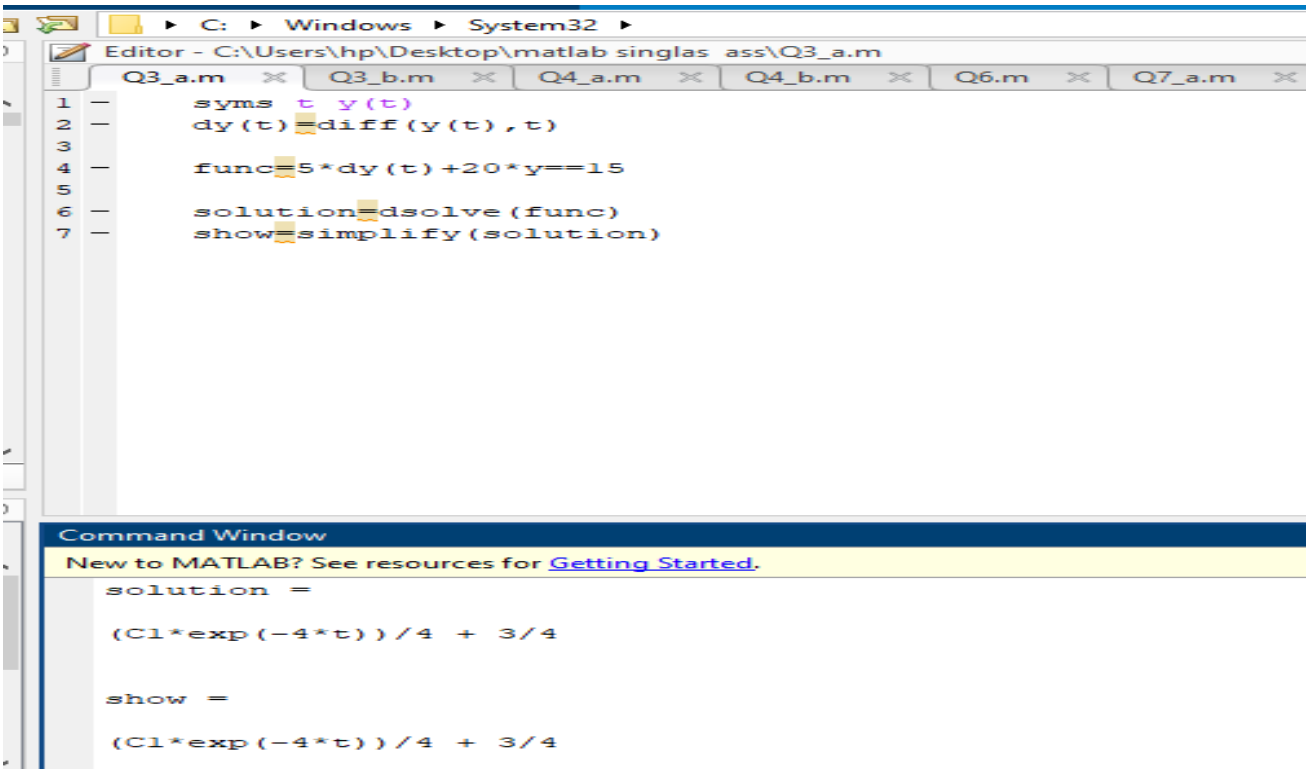


B :

F= 50 KHZ

Question 3

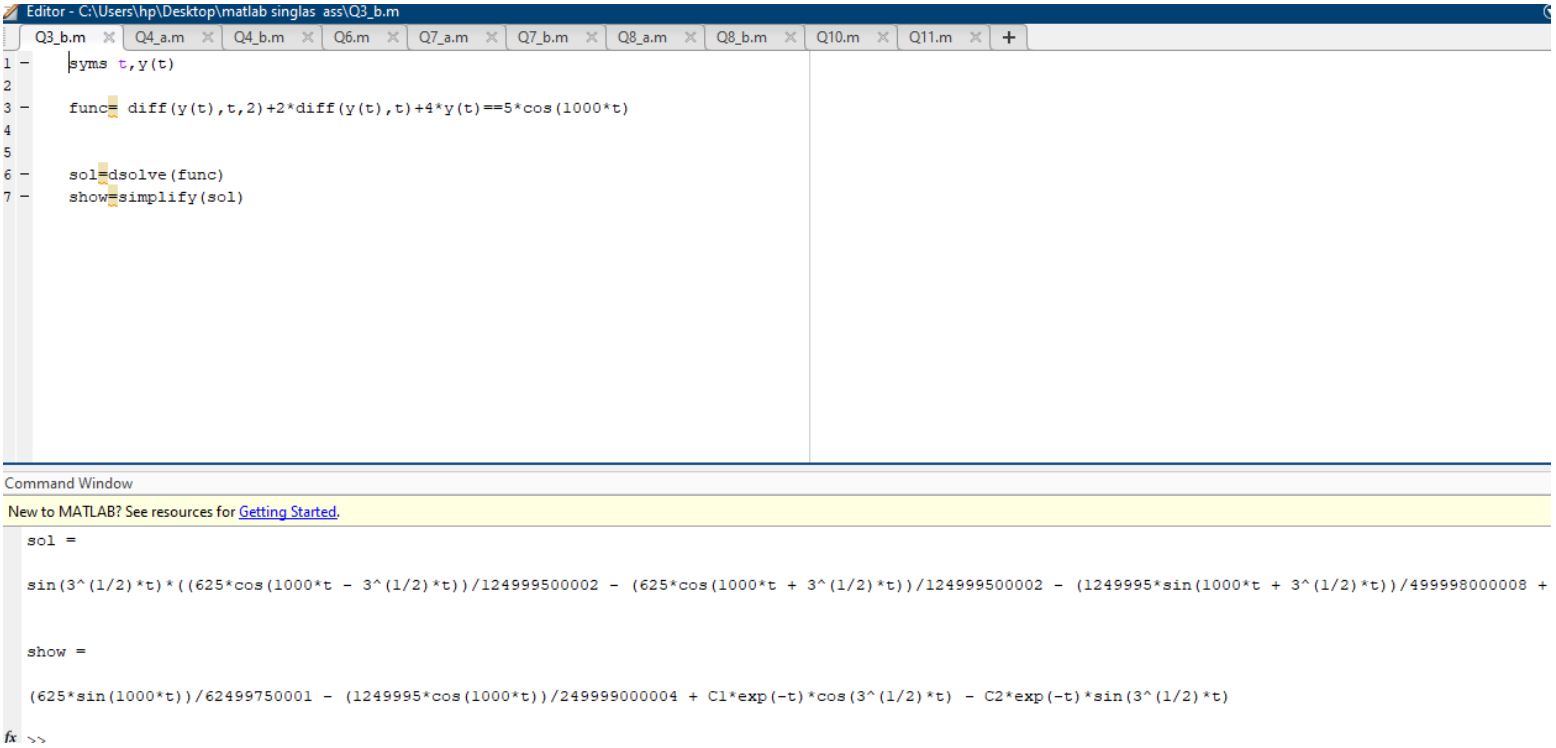
A:



```
Editor - C:\Users\hp\Desktop\matlab singlas  ass\Q3_a.m
Q3_a.m | Q3_b.m | Q4_a.m | Q4_b.m | Q6.m | Q7_a.m

1 —   syms t y(t)
2 —   dy(t)=diff(y(t),t)
3
4 —   func=5*dy(t)+20*y==15
5
6 —   solution=dsolve(func)
7 —   show=simplify(solution)
```

```
Command Window
New to MATLAB? See resources for Getting Started.

solution =

(C1*exp(-4*t))/4 + 3/4


show =

(C1*exp(-4*t))/4 + 3/4
```

B:



```
Editor - C:\Users\hp\Desktop\matlab singlas  ass\Q3_b.m
Q3_b.m | Q4_a.m | Q4_b.m | Q6.m | Q7_a.m | Q7_b.m | Q8_a.m | Q8_b.m | Q10.m | Q11.m | +

1 —   syms t,y(t)
2
3 —   func= diff(y(t),t,2)+2*diff(y(t),t)+4*y(t)==5*cos(1000*t)
4
5
6 —   sol=dsolve(func)
7 —   show=simplify(sol)
```

```
Command Window
New to MATLAB? See resources for Getting Started.

sol =

sin(3^(1/2)*t)*((625*cos(1000*t - 3^(1/2)*t))/124999500002 - (625*cos(1000*t + 3^(1/2)*t))/124999500002 - (1249995*sin(1000*t + 3^(1/2)*t))/499998000008 +


show =

(625*sin(1000*t))/62499750001 - (1249995*cos(1000*t))/249999000004 + C1*exp(-t)*cos(3^(1/2)*t) - C2*exp(-t)*sin(3^(1/2)*t)

fx >>
```

Question 4

A:

Editor - C:\Users\hp\Desktop\matlab singlas ass\Q4_a.m

Q4_a.m | Q4_b.m | Q6.m | Q7_a.m | Q7_b.m | Q8_a.m | Q8_b.m | Q10.m

```
1 -    syms t y(t)
2 -    dy(t)=diff(y(t),t)
3 -    initial_condition1=y(0)==2
4
5 -    func=dy(t)+2*y==7*heaviside(t)
6
7 -    sol2=dsolve(func,initial_condition1)
8 -    show=simplify(sol2)
```

Command Window

New to MATLAB? See resources for Getting Started.

```
sol2 =

exp(-2*t)/4 - exp(-2*t)*((7*sign(t))/4 - (7*exp(2*t)*(sign(t) + 1))/4)


show =

exp(-2*t)/4 + (7*sign(t))/4 - (7*exp(-2*t)*sign(t))/4 + 7/4
```

B:

Q4_b.m | Q6.m | Q7_a.m | Q7_b.m | Q8_a.m | Q8_b.m | Q10.m | Q11.m

```
syms t,y(t)

func= diff(y(t),t,2)+4*diff(y(t),t)+5*y(t)==5*cos(2000*t)

initial_con1=y(0)==1

dy=diff(y,t)
initial_con2=dy(0) ==2

cond = [initial_con1,initial_con2]

sol=dsolve(func,cond)

show=simplify(sol)
```

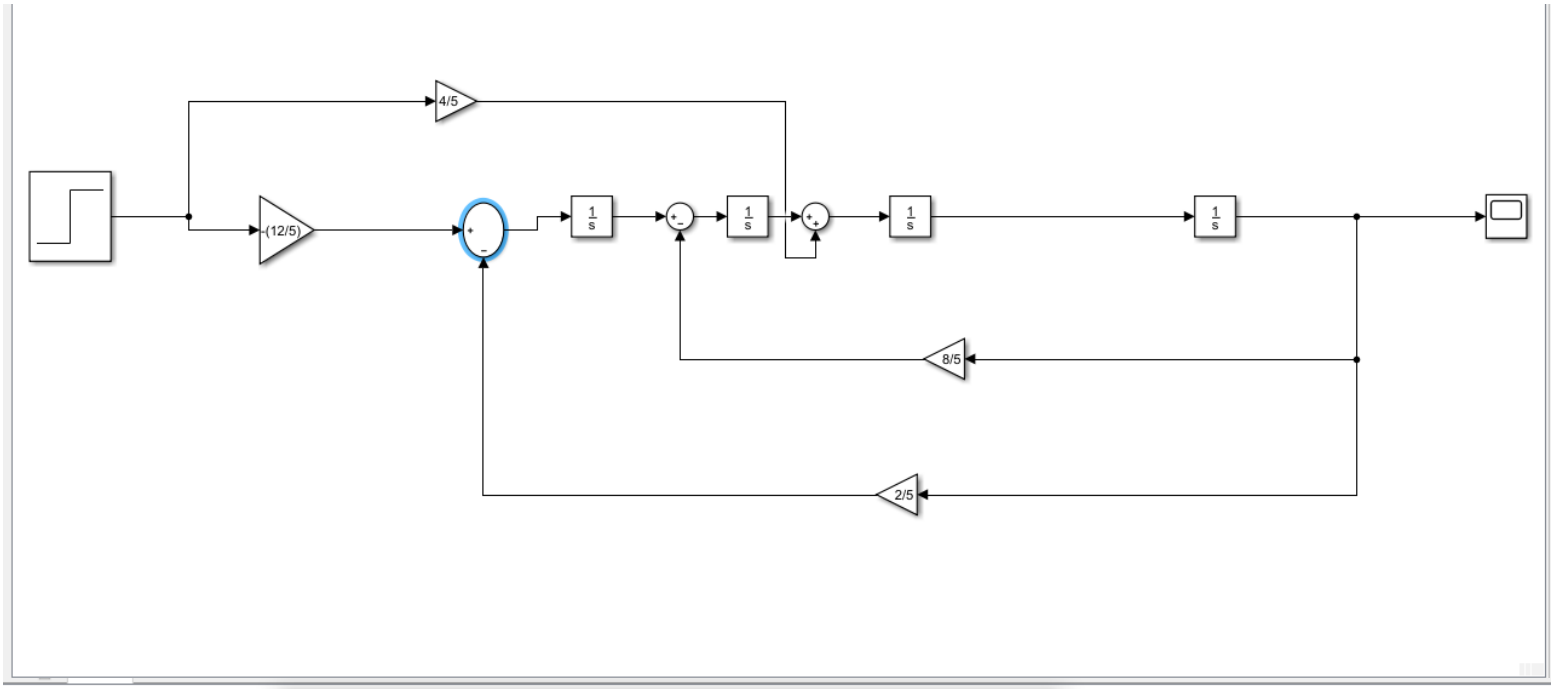
Command Window

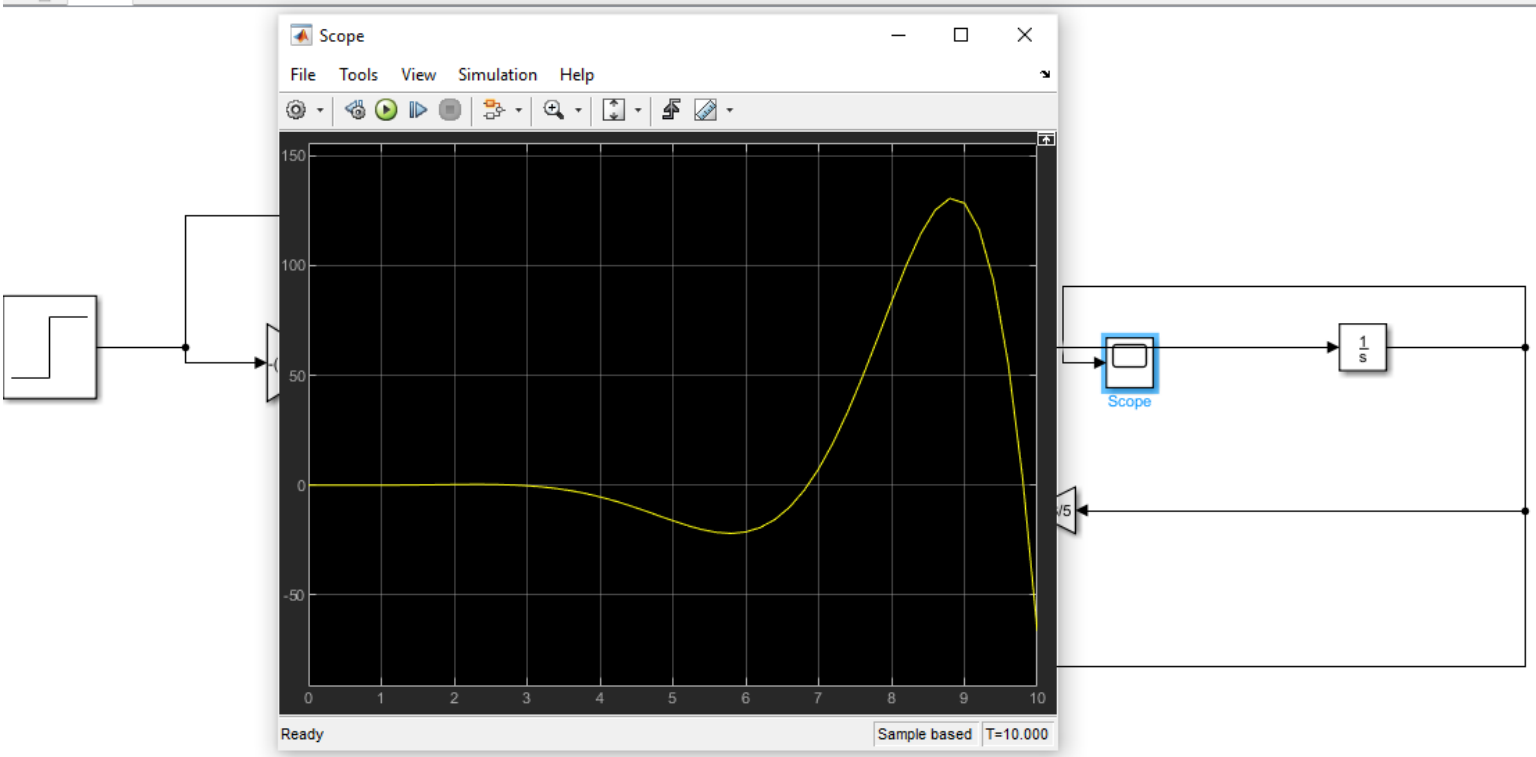
New to MATLAB? See resources for Getting Started.

```
sol =

sin(t)*(cos(1999*t)/799201 + cos(2001*t)/800801 + (1999*sin(1999*t))/1598402 + (2001*sin(2001*t))/1601602) - cos(t)*((1999*cos(1999*t))/1598402 - (2001*cos(


show =

sin(t)*(cos(1999*t)/799201 + cos(2001*t)/800801 + (1999*sin(1999*t))/1598402 + (2001*sin(2001*t))/1601602) - cos(t)*((1999*cos(1999*t))/1598402 - (2001*cos(

fx >>
```

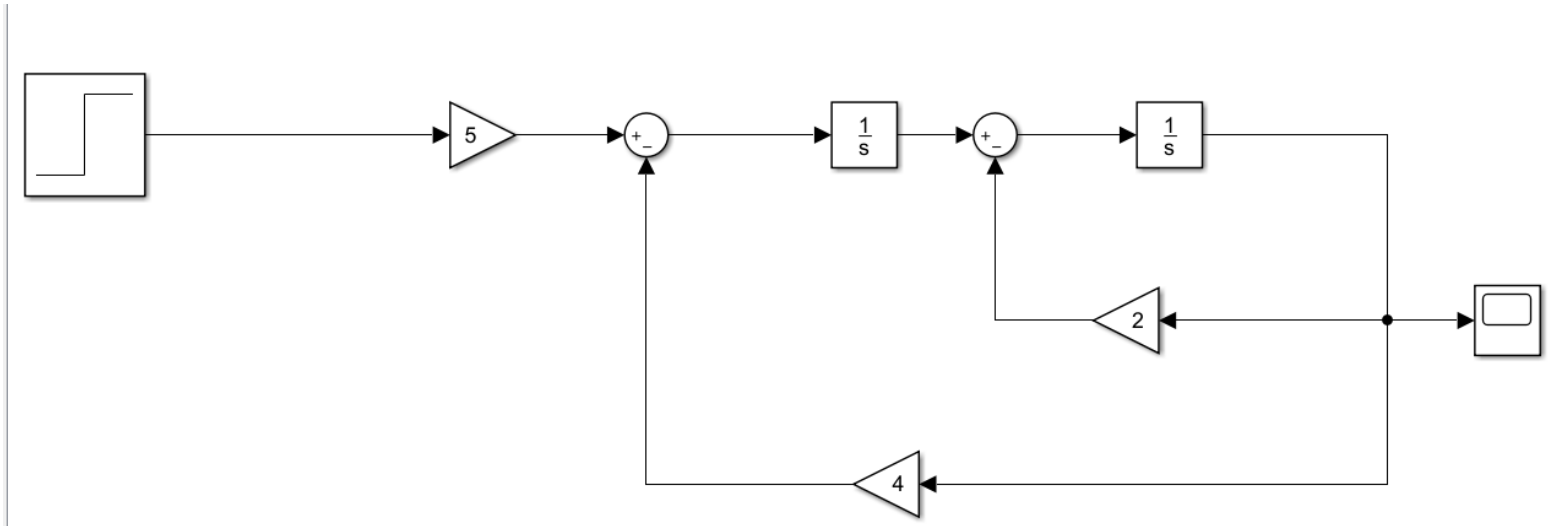
Question 5

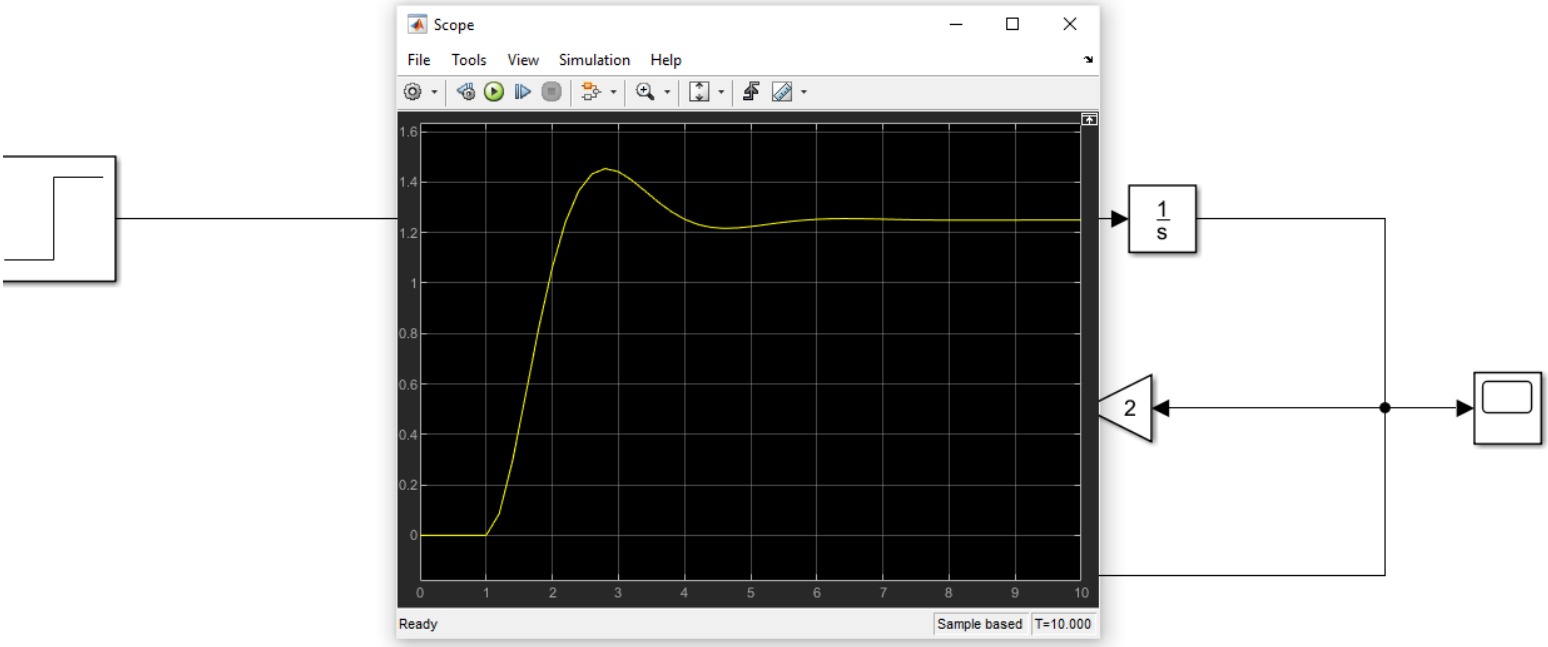
A:


4/5
(12/5)
1/s
1/s
1/s
1/s
8/5
2/5


Scope
File Tools View Simulation Help
150
100
50
0
-50
0 1 2 3 4 5 6 7 8 9 10
Ready
Sample based
T=10.000
Scope
1/s

B:

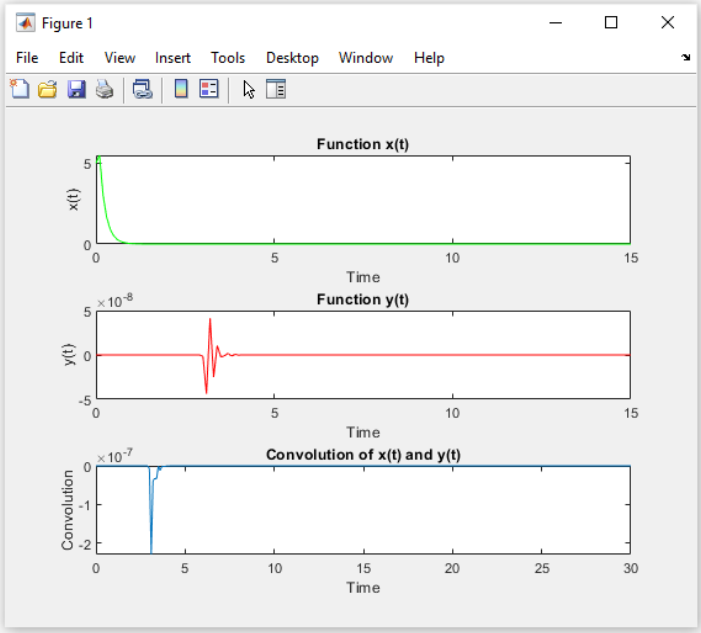

5
1
s
1
s
2
4


Scope
File
Tools
View
Simulation
Help
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
7
8
9
10
Ready
Sample based
T=10.000
1
s
2

Question 6

Q6.m | Q7_a.m | Q7_b.m | Q8_a.m | Q8_b.m | Q10.m | Q11.m

```
t = 0:0.1:15;
x = (10*exp(-6*t)).*rectangularPulse((t-2)/4);
y = (10*exp(-6*t).*cos(100*t)).*rectangularPulse((t-6)/6);


% Plotting the original functions
subplot(3, 1, 1);
plot(t, x,'g');
xlabel('Time');
ylabel('x(t)');
title('Function x(t)');

subplot(3, 1, 2);
plot(t, y,'r');
xlabel('Time');
ylabel('y(t)');
title('Function y(t)');

%t1=0:0.1:10;
convolution = conv(x, y);
subplot(3, 1, 3);
t_conv = linspace(0, (length(convolution)-1)*0.1, length(convolution));
plot(t_conv, convolution);
xlabel('Time');
ylabel('Convolution');
title('Convolution of x(t) and y(t)');
```

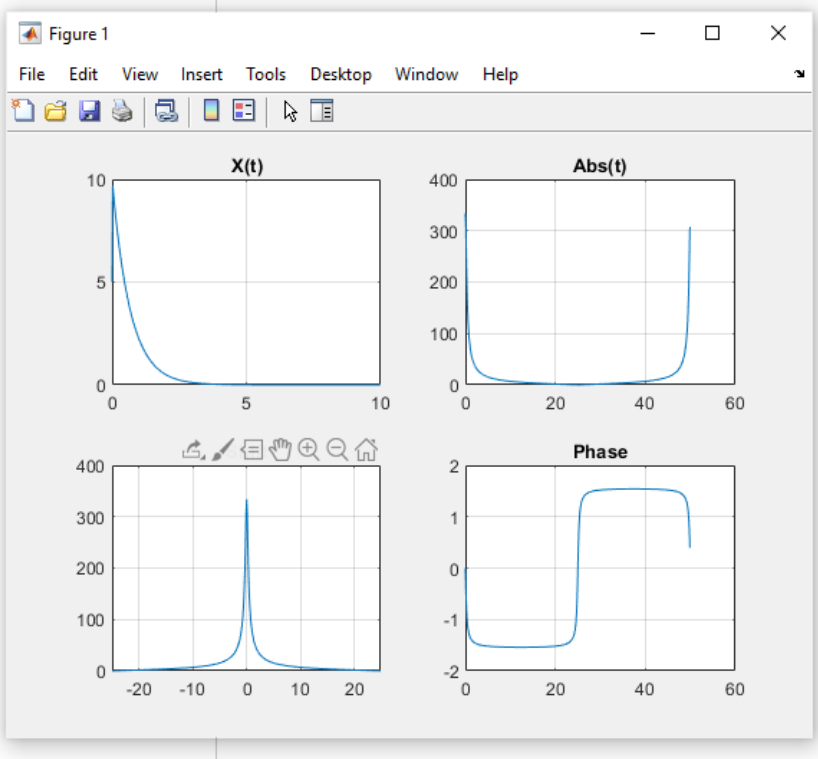


Question 7

A:

Q7_a.m | Q7_b.m | Q8_a.m | Q8_b.m | Q10.m | Q11.m

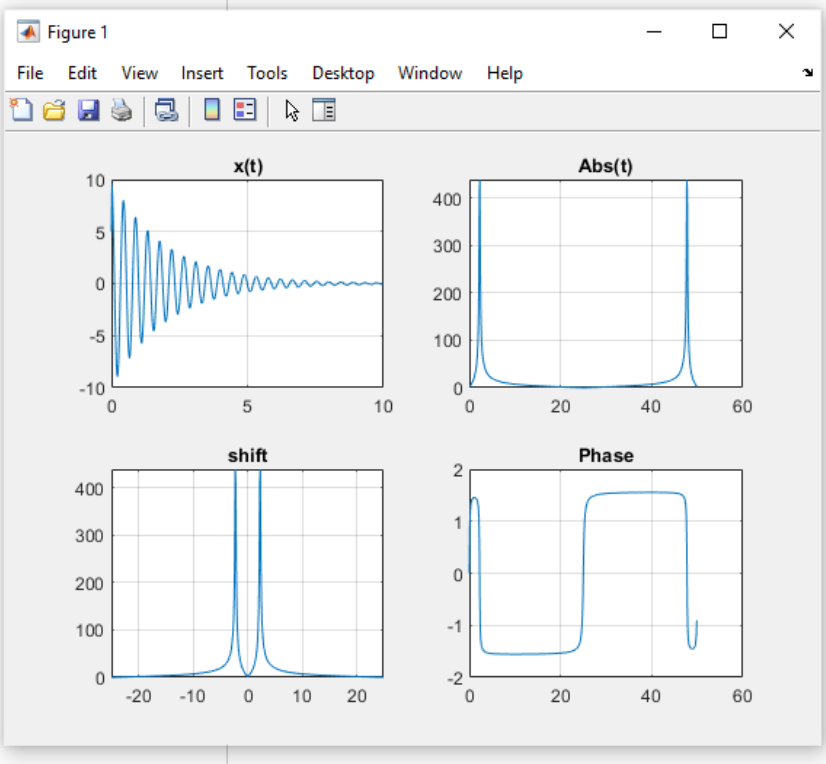
```
Ts=1/50;
t = 0:Ts:10-Ts;
x = 10 * exp(-(3/2)*t).* heaviside(t);

subplot(2,2,1)
plot (t,x)
title('X(t)')
grid on

y = fft(x);
fs = 1/Ts;
f = (0:length(y)-1)*fs/length(y);

subplot(2,2,2)
plot (f,abs(y));
title('Abs(t)')
grid on

n=length(x);
fshift = (-n/2:n/2-1) * (fs/n);
yshift =fftshift (y);
subplot(2,2,3)
plot (fshift,abs(yshift))
title('Shift')
grid on
subplot(2,2,4)
plot (f,phase(y));
title('Phase')
grid on
```



B:

Q7_b.m | Q8_a.m | Q8_b.m | Q10.m | Q11.m

```
Ts=1/50;
t = 0:Ts:10-Ts;
x = 10.*exp(-(1/2).*t).*cos(300*t).*heaviside(t);
subplot(2,2,1)
plot (t,x)
title('x(t)')
grid on
y=fft(x);
Fs=1/Ts;
f=(0:length(y)-1)*Fs/length(y);
subplot(2,2,2)
plot (f,abs(y));
title('Abs(t)')
grid on

n=length(x);
fshift = (-n/2:n/2-1) * (Fs/n);
yshift =fftshift (y);

subplot(2,2,3)
plot (fshift,abs(yshift));
title('shift')
grid on

subplot(2,2,4)
plot (f,phase(y));
title('Phase')
grid on
```



Question 8

A:

Q8_a.m | Q8_b.m | Q10.m | Q11.m

```
syms s t;
y = (15-15*exp(-.25*t))*heaviside(t);
Y = laplace( y, t , s);
pretty(Y);
```

Command Window

New to MATLAB? See resources for Getting Started.

```
>> Q8_a
15       15
-- - -------
 s         1
      s + -
          4

>> A
```

B:

Q8_b.m | Q10.m | Q11.m

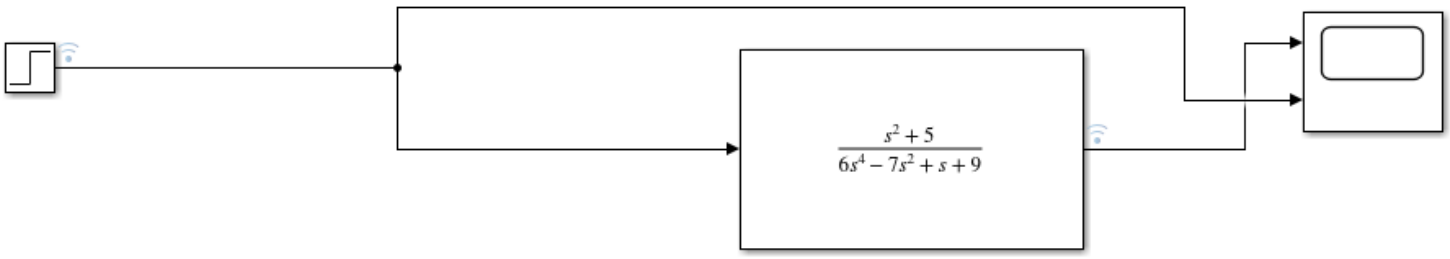
```
syms s t;
y = (20-8*exp(-3*t)*cos(100*t))*heaviside(t);
Y = laplace( y, t , s);
pretty(Y);
```

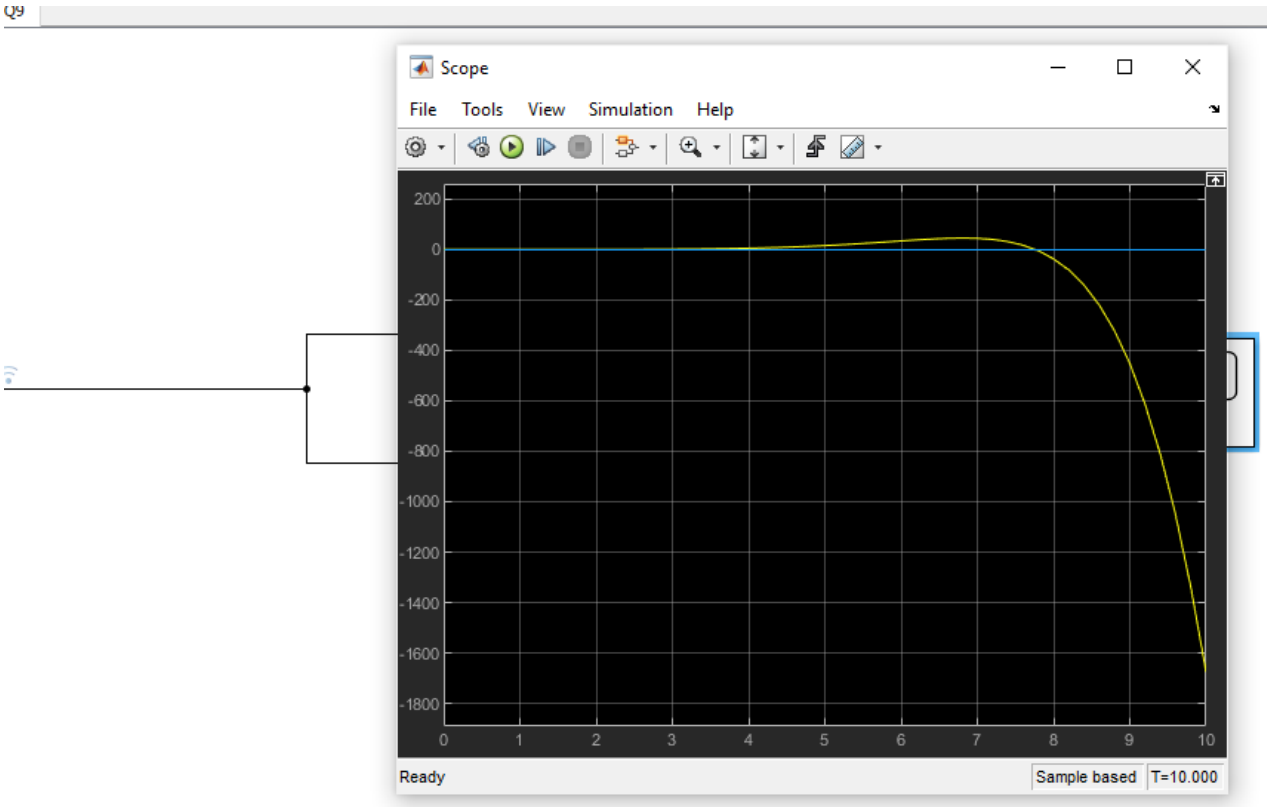
Command Window

New to MATLAB? See resources for Getting Started.

```
>> Q8_b
20         8 (s + 3)
-- - ----------------
 s             2
      (s + 3)  + 10000
```

Question 9


$\frac{s^2+5}{6s^4-7s^2+s+9}$


Q9
Scope
File
Tools
View
Simulation
Help
200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
-1800
0
1
2
3
4
5
6
7
8
9
10
Ready
Sample based
T=10.000

Question 10

Q10.m | Q11.m

```
1 -    syms s t y(t)
2
3 -    y = 7/(s+2);
4 -    ylaplace = ilaplace(y,s,t);
5 -    disp("Inverse Laplace part 1");
6 -    disp(ylaplace);
7
8 -    y2 = 5 / (s^2 + 4*s + 5);
9 -    y2laplace = ilaplace(y2,s,t);
0 -    disp("Inverse Laplace part 2");
1 -    disp(y2laplace);
```

ommand Window

lew to MATLAB? See resources for Getting Started.

```
>> Q10
Inverse Laplace part 1
7*exp(-2*t)

Inverse Laplace part 2
5*exp(-2*t)*sin(t)
```

Question 11

Editor - C:\Users\hp\Desktop\matlab singlas ass\Q11.m*

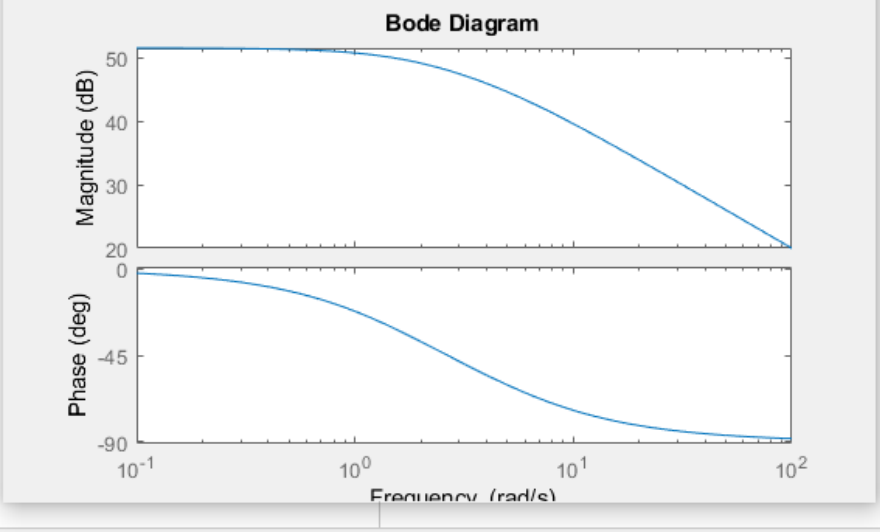
Q11.m*

```
1 -    num=[1 3];
2 -    den=[1 6 8];
3 -    T=tf(num,den)
4 -    T2=1000*T
5      step(T2)
6 -    bode(T2)
7      %when we want step we comman the bode
8      %when we want bode we comman the step
```

Q11.m

```
1 -    num=[1 3];
2 -    den=[1 6 8];
3 -    T=tf(num,den)
4 -    T2=1000*T
5      %step(T2)
6 -    bode(T2)
7      %when we want step we comman the bode
8      %when we want bode we comman the step
```

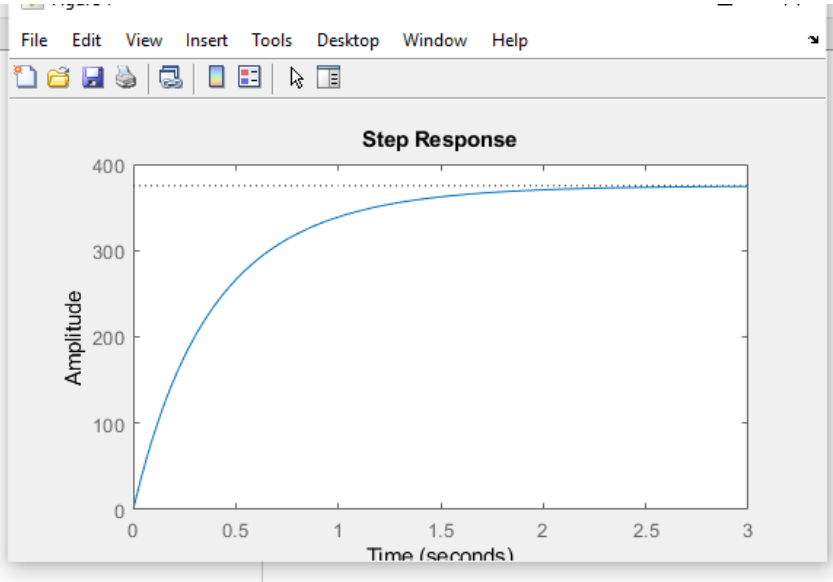
File Edit View Insert Tools Desktop Window Help



Command Window

Q11.m

```
num=[1 3];
den=[1 6 8];
T=tf(num,den)
T2=1000*T
step(T2)
%bode(T2)
%when we want step we comman the bode
%when we want bode we comman the step
```



Command Window