FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

ENEE2312

SIGNAL AND SYSTEM –EE2312

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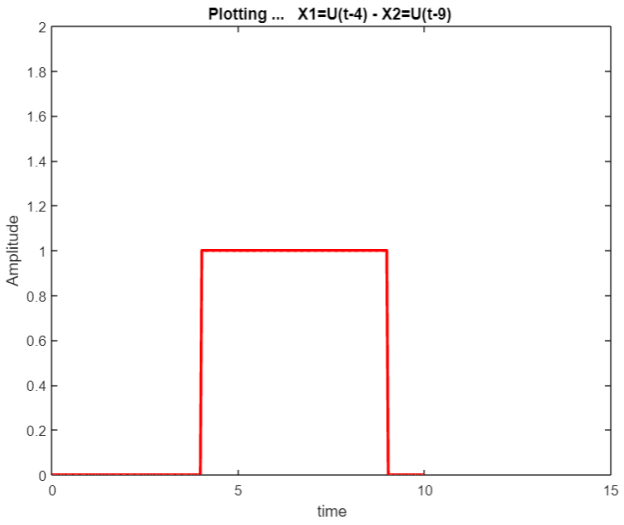
- INSTRUCTOR: Dr. Ashraf Alrimawi.
- Section : 2 .

- Date : 8/6/2022 .

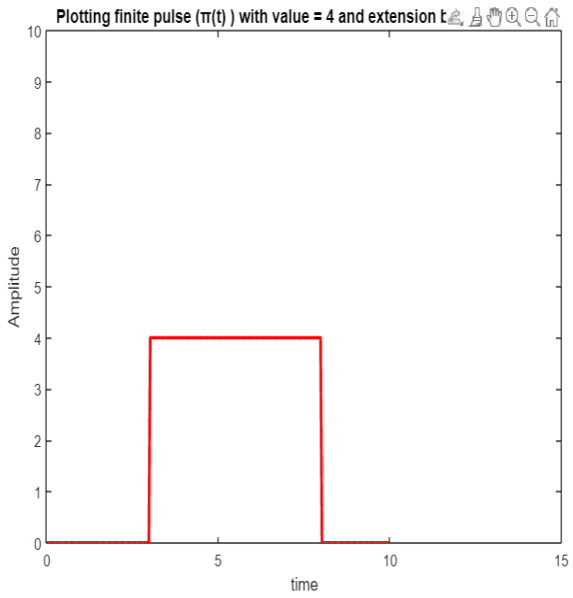
Q1-a : X(t)=u(t-4) – u(t-9)

```
%Salwa Fayyad 1200430
y1=heaviside(t-4)
y2=heaviside(t-9)

x=y1-y2

plot(t,x,'r','LineWidth',2)
xlabel('time')
ylabel('Amplitude')
title('Plotting ...   X1=U(t-4) - X2=U(t-9) ')

axis([0 15 0 2])
```



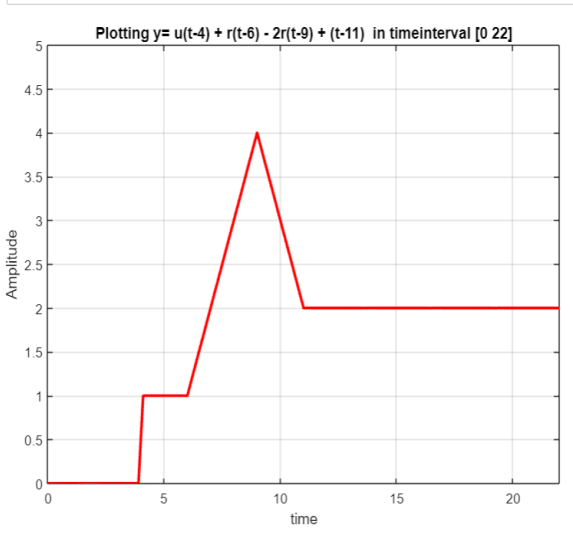
Q1-b : A finite pulse (π(t)) with value = 4 and extension between 3 and 8

```
%Salwa Fayyad 1200430
y1=heaviside(t-3)
y2=heaviside(t-8)

x=4*(y1-y2)

plot(t,x,'r','LineWidth',2)
xlabel('time')
ylabel('Amplitude')
title('Plotting finite pulse (π(t) ) with value = 4 and extension between 3 and 8')
axis([0 15 0 10])
```



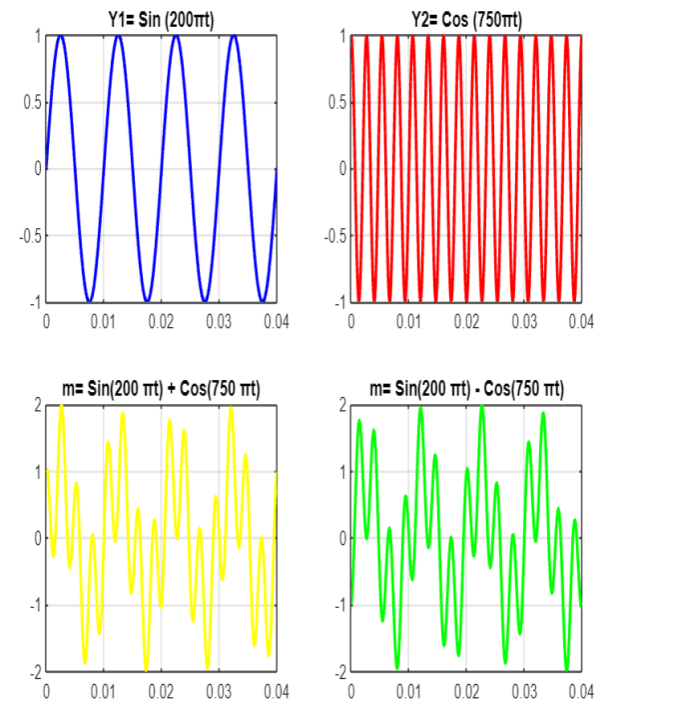
Q1-c:

```
%Salwa Fayyad 1200430

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

y1= u1 + r1 - 2*r2 + r3

plot(t,y1,'r','LineWidth',2)
xlabel('time')
ylabel('Amplitude')
title('Plotting y= u(t-4) + r(t-6) - 2r(t-9) + (t-11)  in timeinterval [0 22]')
axis([0 22 0 5])
grid on
```



Q2 :

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

m=y1+y2
n=y1-y2

subplot(2,2,1)
plot(t,y1,'b','LineWidth',2)
title('Y1= Sin (200πt)')
grid on

subplot(2,2,2)
plot(t,y2,'r','LineWidth',2)
title('Y2= Cos (750πt)')
grid on

subplot(2,2,3)
plot(t,m,'y','LineWidth',2)
title('m= Sin(200 πt) + Cos(750 πt)')
grid on

subplot(2,2,4)
plot(t,n,'g','LineWidth',2)
title('m= Sin(200 πt) - Cos(750 πt)')
grid on
```



Q2 –b

F= 50 KHZ

Q3_a

```
%SALWA FAYYAD
syms t y(t)
dy(t)=diff(y(t),t)

func=10*dy(t)+20*y==10

solution=dsolve(func)
show=simplify(solution)
```

```
solution =

(C1*exp(-2*t))/2 + 1/2
```

Q3 –b:

```
1
2   %SALWA FAYYAD
3
4   syms t,y(t)
5
6   func= diff(y(t),t,2)+2*diff(y(t),t)+4*y(t)==5*cos(1000*t)
7
8
9   sol=dsolve(func)
10  show=simplify(sol)
11
12
13
```

```
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)

>> sol

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))/4999980000008 + (1249995*sin(1000*t - 3^(1/2)*t))/4999
```

Q4-a:

```
%SALWA FAYYAD
syms t y(t)
dy(t)=diff(y(t),t)
initial_condition1=y(0)==3

func=dy(t)+5*y==10*heaviside(t)

sol2=dsolve(func,initial_condition1)
show=simplify(sol2)
```

```
sol2 =

2*exp(-5*t) - exp(-5*t)*(sign(t) - exp(5*t)*(sign(t) + 1))
```

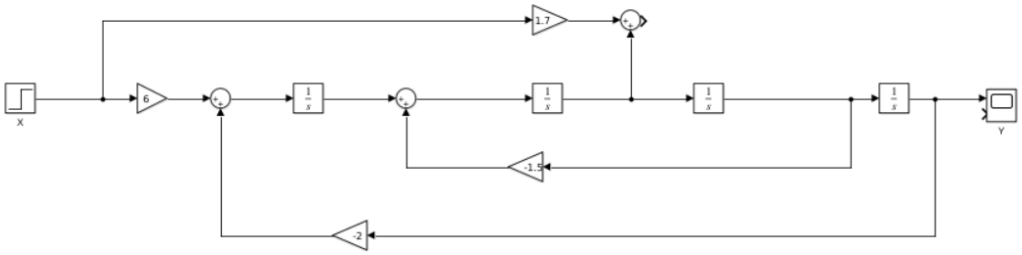
Q4-b:

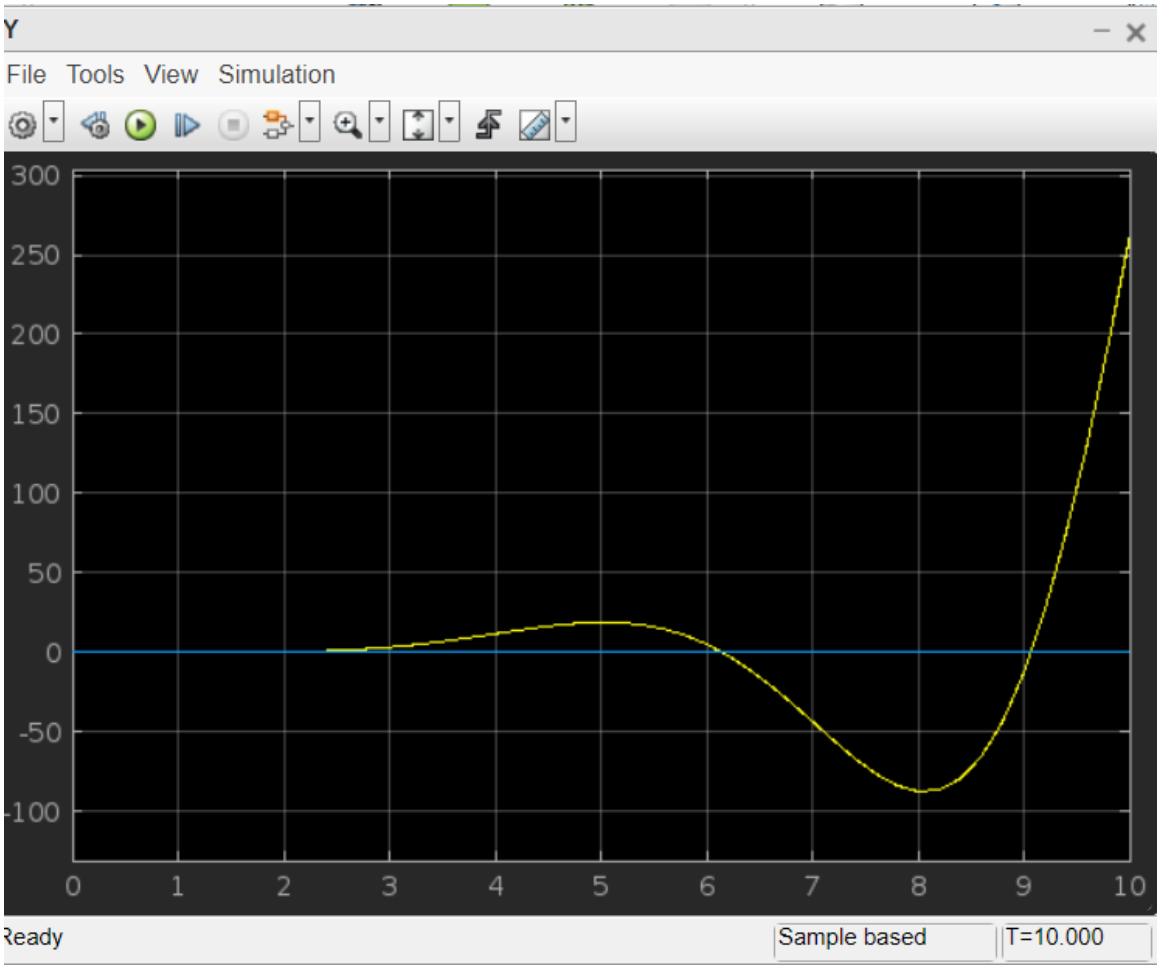
```
%SALWA FAYYAD

syms t,y(t)

func= diff(y(t),t,2)+2*diff(y(t),t)+2*y(t)==5*cos(2500*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)
```

sol =

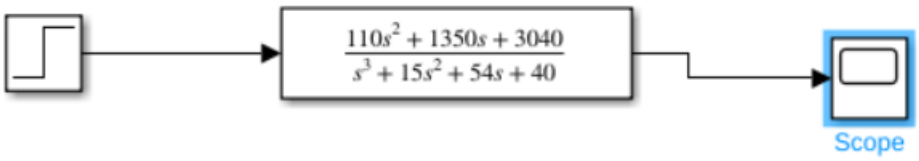
sin(t)*((5*cos(2499*t))/12490004 + (5*cos(2501*t))/12510004 + (12495*sin(2499*t))/12490004 + (12505*sin(2501*t))/12510004) - cos(t)*((12495*cos(2499*t))/12490004 - (12505*cos(2501*t))/12510004

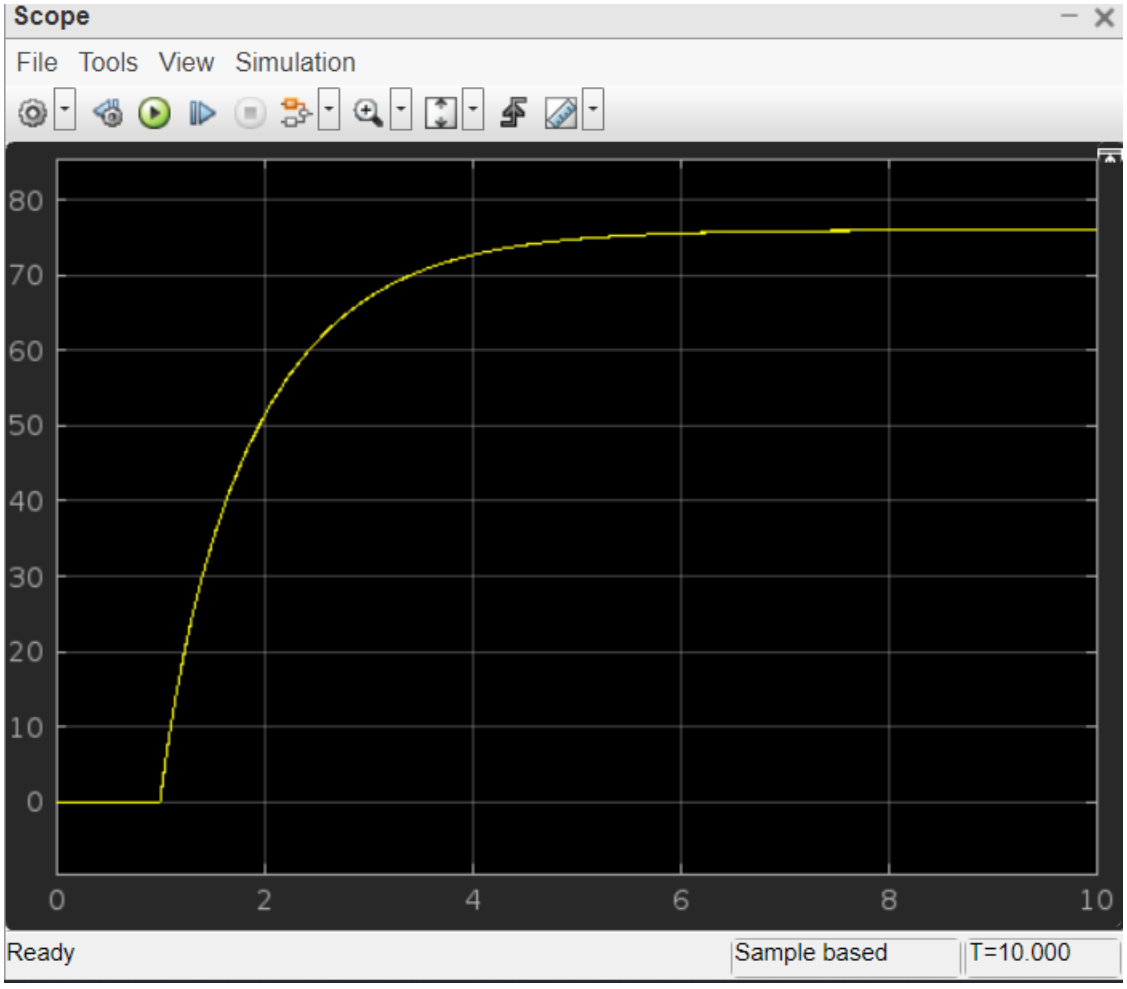
Q5-a





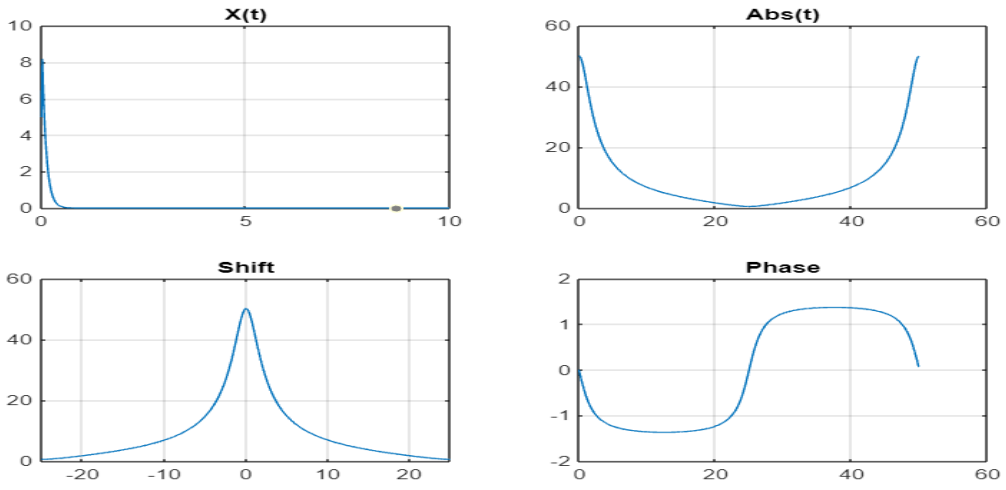
Q5 –b:


$\frac{110s^2 + 1350s + 3040}{s^3 + 15s^2 + 54s + 40}$
Scope


Scope
File Tools View Simulation
80
70
60
50
40
30
20
10
0
0 2 4 6 8 10
Ready
Sample based
T=10.000

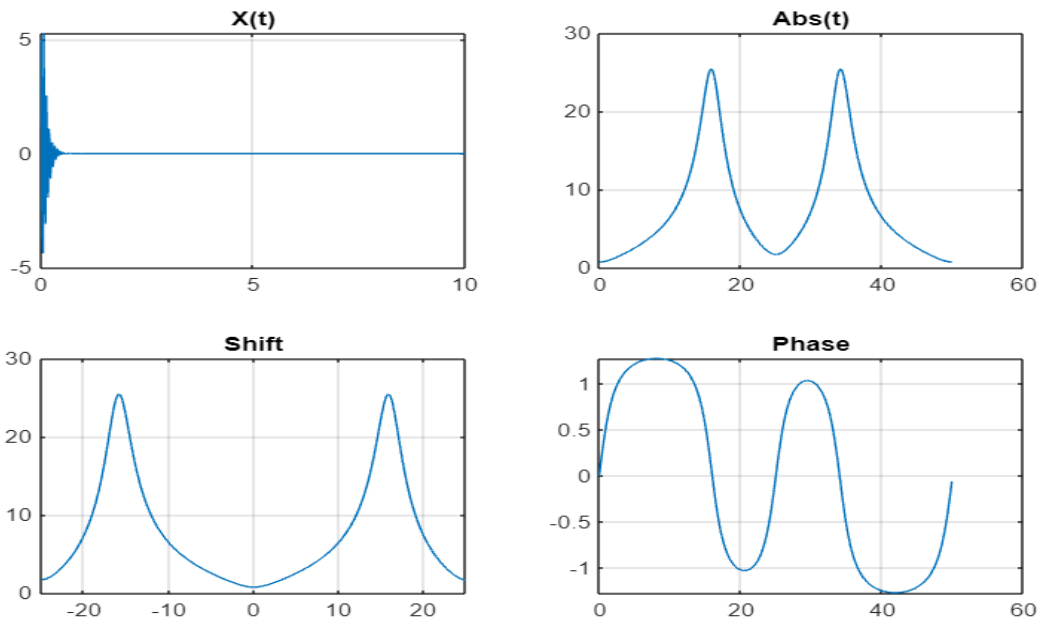
Q6-a:

```
%SALWA FAYYAD

Ts=1/50;
t = 0:Ts:10-Ts;
x = 10 * exp(-10*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

```



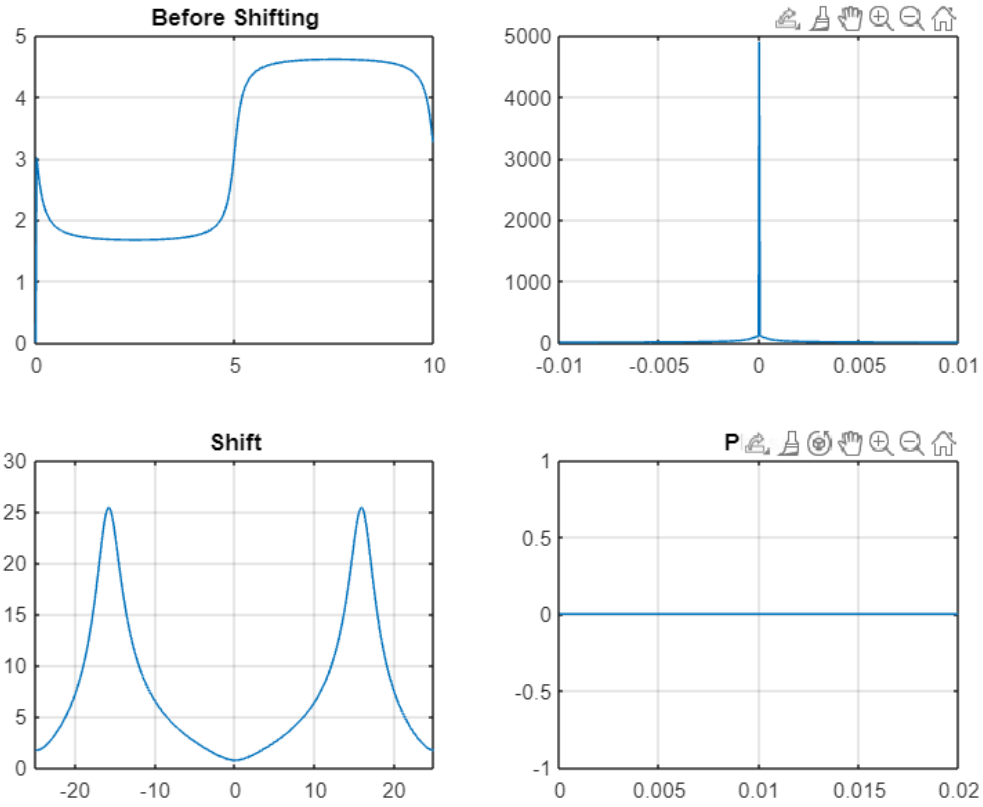
Q6:b

```
%SALWA FAYYAD

Ts=1/50;
t = 0:Ts:10-Ts;
x = (10 .* exp(-10*t).*cos(100.*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
```



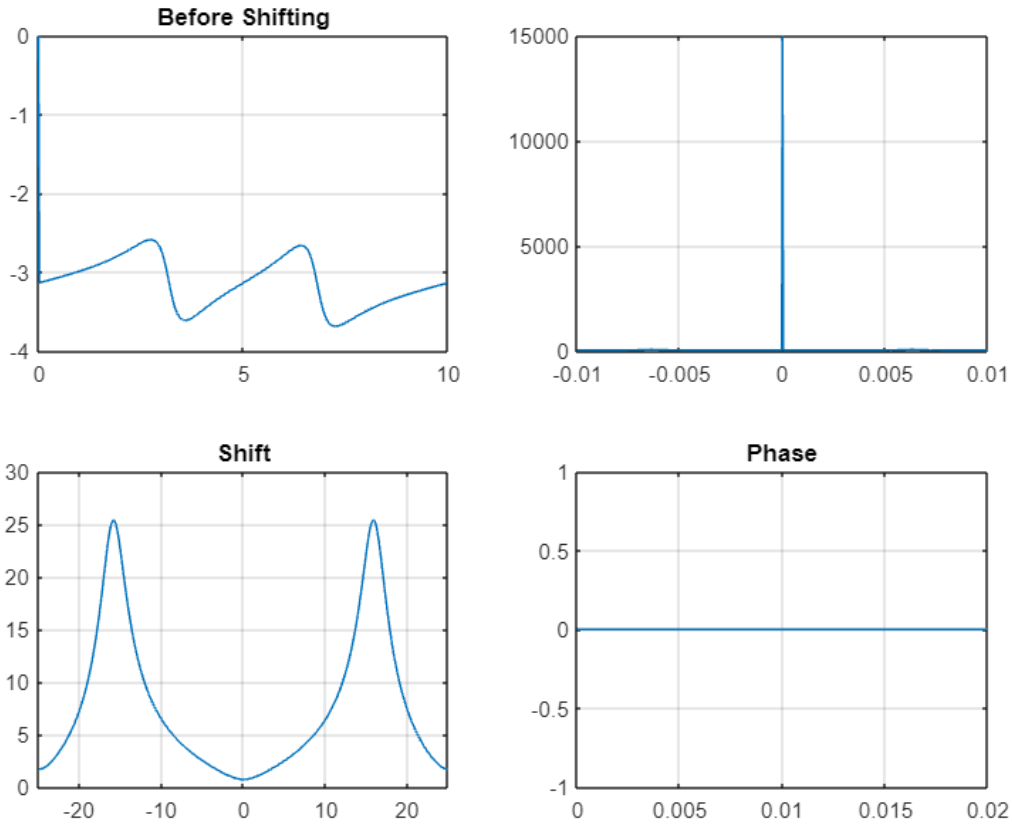
Q7 :a

```
%SALWA FAYYAD

Ts=1/50;
t = 0:Ts:10-Ts;
y = 10-10.*exp(-5.*t).*heaviside(t);


yf=fft(y)
fs=1/50;
f = (0:length(yf)-1)*fs/length(yf);
%t = 0:Ts:10-Ts;


subplot(2,2,1)
plot (t,phase(yf))
title('Before Shifting')
grid on

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

subplot(2,2,2)
plot (fshift,abs(yshift));
grid on


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

```


Before Shifting
5
4
3
2
1
0
0
5
10
5000
4000
3000
2000
1000
0
-0.01
-0.005
0
0.005
0.01
Shift
30
25
20
15
10
5
0
-20
-10
0
10
20
P
1
0.5
0
-0.5
-1
0
0.005
0.01
0.015
0.02

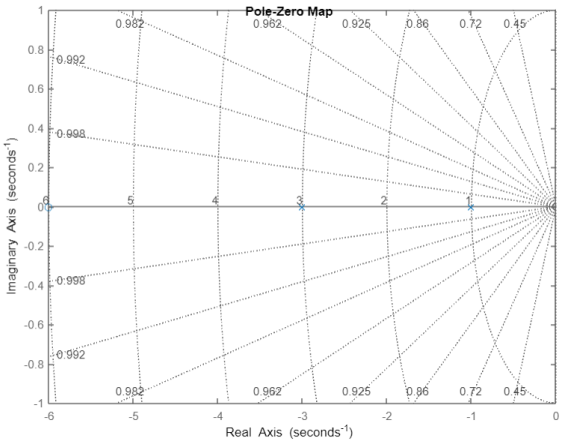
Q7 :b

```
%SALWA FAYYAD

Ts=1/50;
t = 0:Ts:10-Ts;
y = (30-10.*exp(-8.*t).*cos(100*t)).*heaviside(t);


yf=fft(y)
fs=1/50;
f = (0:length(yf)-1)*fs/length(yf);
%t = 0:Ts:10-Ts;


subplot(2,2,1)
plot (t,phase(yf))
title('Before Shifting')
grid on

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

subplot(2,2,2)
plot (fshift,abs(yshift));
grid on


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

```



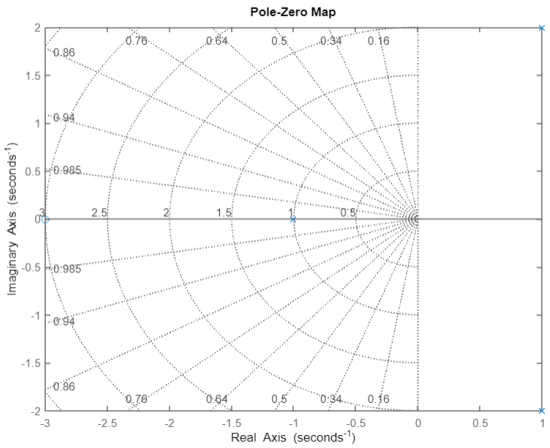
Q8:a

```
% SALWA FAYYAD

%func = s+6/s^2+4s+3

system=tf([1,6],[1,4,3])
pzplot(system)
grid on
```



Q8 :b

```
% SALWA FAYYAD

%func = s+3/s^3-s^2+3*s+5

system=tf([1,3],[1,-1,3,5])
pzplot(system)
grid on
```



Q9:

```
%SALWA FAYYAD

syms s
y= (s+6)/(s^2+4*s+3)

ys=ilaplace(y)
yf=fourier(ys)



y2=(s+3)/(s^3-s^2+3*s+5)
ys2=ilaplace(y)
yf2=fourier(ys2)
```

```
y =

(s + 6)/(s^2 + 4*s + 3)


ys =

(5*exp(-t))/2 - (3*exp(-3*t))/2


yf =

(5*fourier(exp(-t), t, w))/2 - (3*fourier(exp(-3*t), t, w))/2
```

```
y2 =

(s + 3)/(s^3 - s^2 + 3*s + 5)


ys2 =

(5*exp(-t))/2 - (3*exp(-3*t))/2


yf2 =

(5*fourier(exp(-t), t, w))/2 - (3*fourier(exp(-3*t), t, w))/2

>>
```