Ερώτημα 1ο

```
%1
RC=0.001;
w=0:50:5000;
H=(1/RC)./(j*w+1/RC);
Hmetro=abs(H);
Hfash=180*angle(H)/pi;
figure(1);
subplot(211);
plot(w,Hmetro);
xlabel('Frequency, rad/sec');
ylabel('|H|');
subplot(212);
plot(w,Hfash);
xlabel('Frequency, rad/sec');
ylabel('angle H, degrees');
```
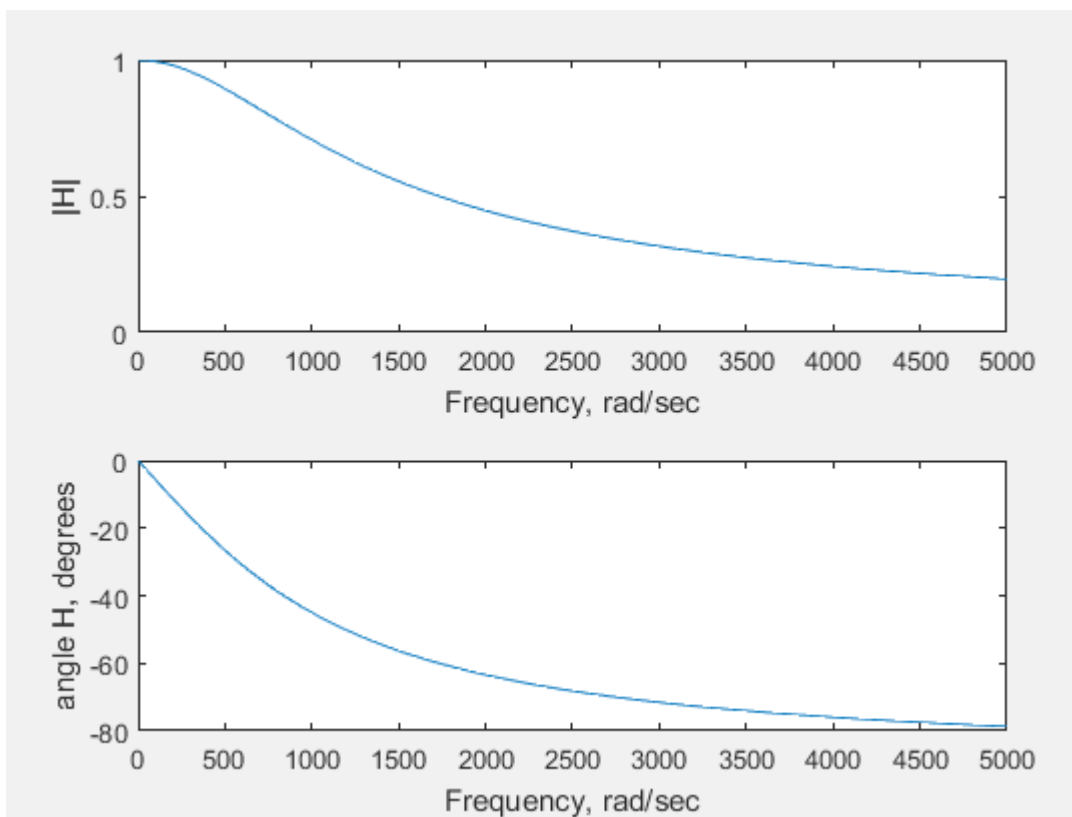
```
%values of H for several values of frequency (w - rad/sec)
%w=0
index=find(w==0);
abs(H(index))
180*angle(H(index))/pi
%w=1000
index=find(w==1000);
abs(H(index))
180*angle(H(index))/pi
%w=3000
index=find(w==3000);
abs(H(index))
180*angle(H(index))/pi
```

```
ans =

     1


ans =

     0


ans =

    0.7071


ans =

   -45


ans =

    0.3162


ans =

  -71.5651
```
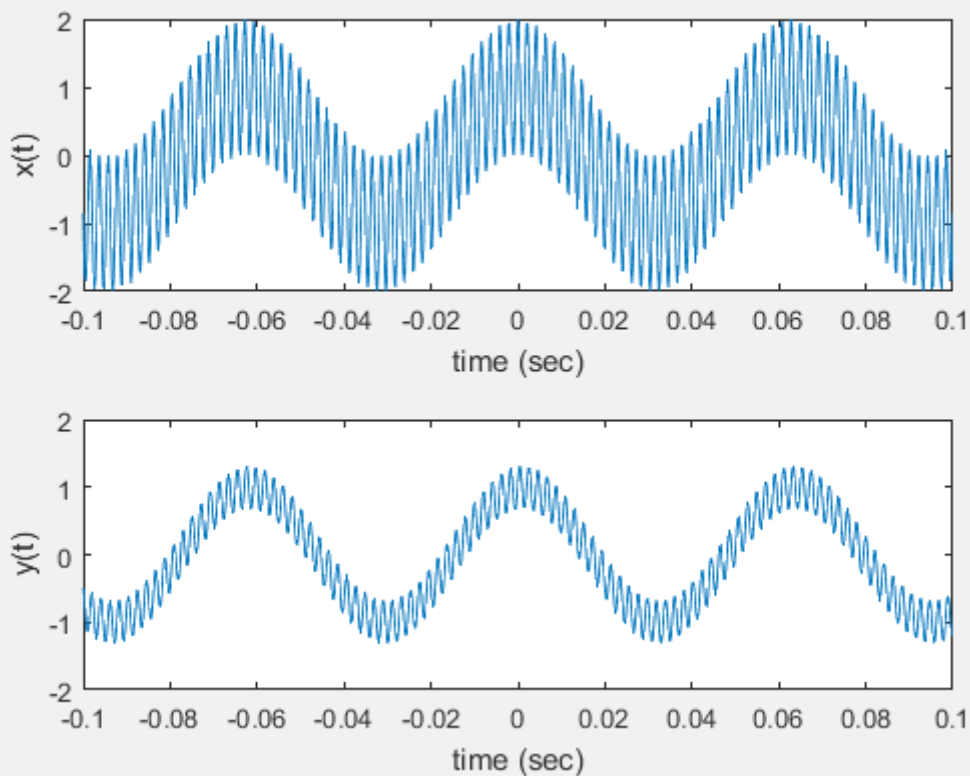
Ερώτημα 2ο

```
%2
RC=0.001;
t=-0.1:0.2/1000:0.1;
w1=100;
w2=3000;
Hw1=(1/RC)./(j*w1+1/RC);
Hw2=(1/RC)./(j*w2+1/RC);
x=cos(w1*t)+cos(w2*t);
y=abs(Hw1)*cos(w1*t+angle(Hw1))+abs(Hw2)*cos(w2*t+angle(Hw2));
figure(2);
subplot(211);
plot(t,x);
xlabel('time (sec)')
ylabel('x(t)');
subplot(212);
plot(t,y);
xlabel('time (sec)')
ylabel('y(t)');
```
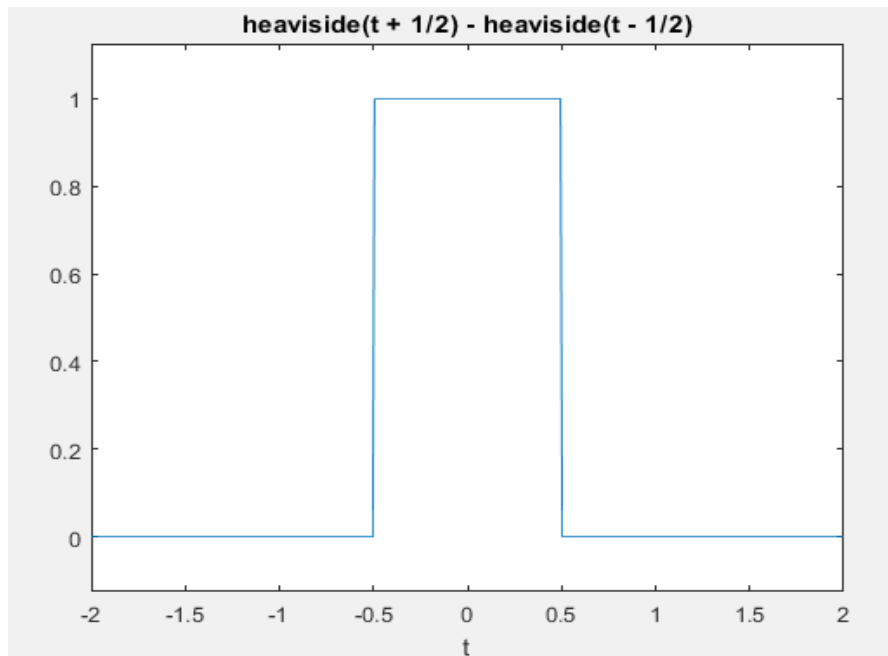
Ερώτημα 3ο

```
%3
syms t w;
x=heaviside(t+0.5)-heaviside(t-0.5);
ezplot(x,[-2 2]);
```
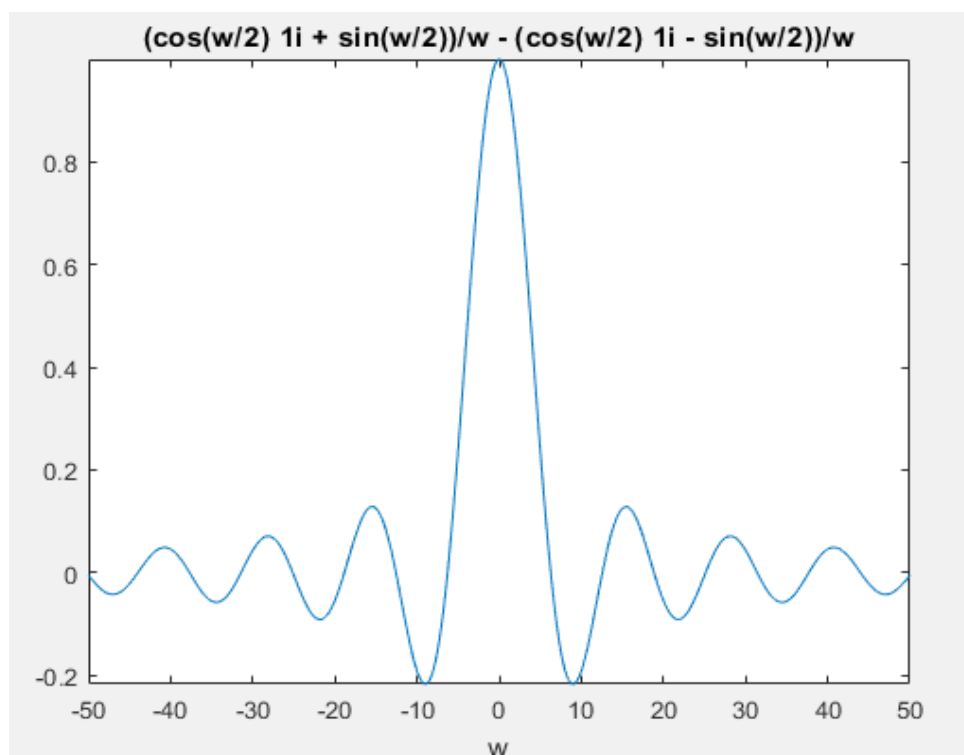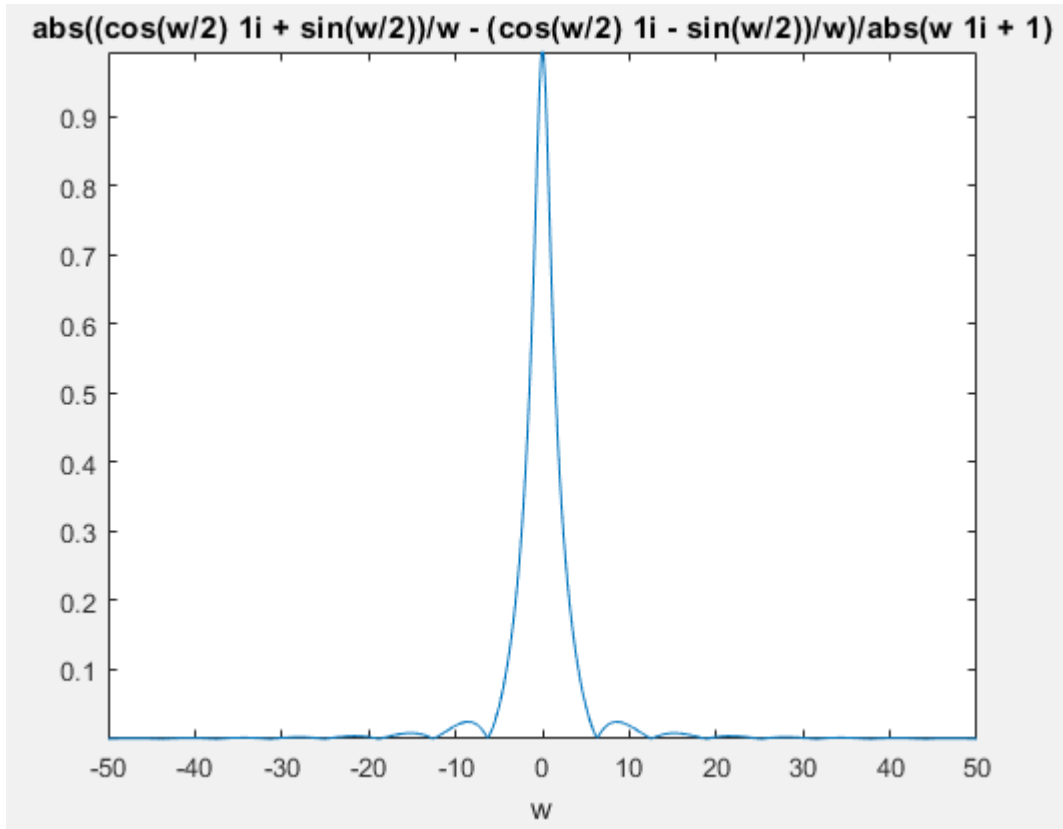


```
X=fourier(x,w);
ezplot(X,[-50 50]);
axis tight;
```

```
RC=1;
H=(1/RC)./(j*w+1/RC);
simplify(X,'steps',100)
Y=H.*X;
simplify(Y,'steps',100)
ezplot(abs(Y),[-50 50]);
axis tight;
```


abs((cos(w/2) 1i + sin(w/2))/w - (cos(w/2) 1i - sin(w/2))/w)/abs(w 1i + 1)

```
syms t;
y=ifourier(Y,t);
ezplot(abs(y));
```


abs(2 π heaviside(t - 1/2) - 2 π heaviside(t + 1/2) - 2 π heaviside(t - 1/2) exp(-t) exp(1/2) + 2 π heaviside(t + 1/2) exp(-t) exp(-1/2))/(2 π)

```
RC=0.1;
H=(1/RC)./(j*w+1/RC);
simplify(X,'steps',100)
Y=H.*X;
simplify(Y,'steps',100)
ezplot(abs(Y),[-50 50]);
axis tight;
```


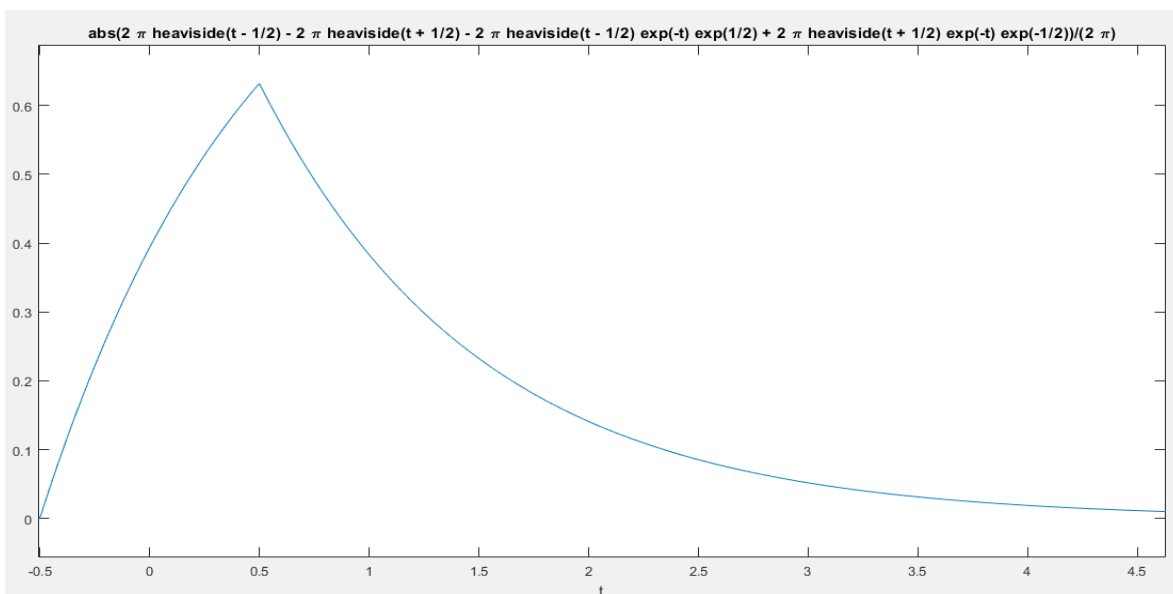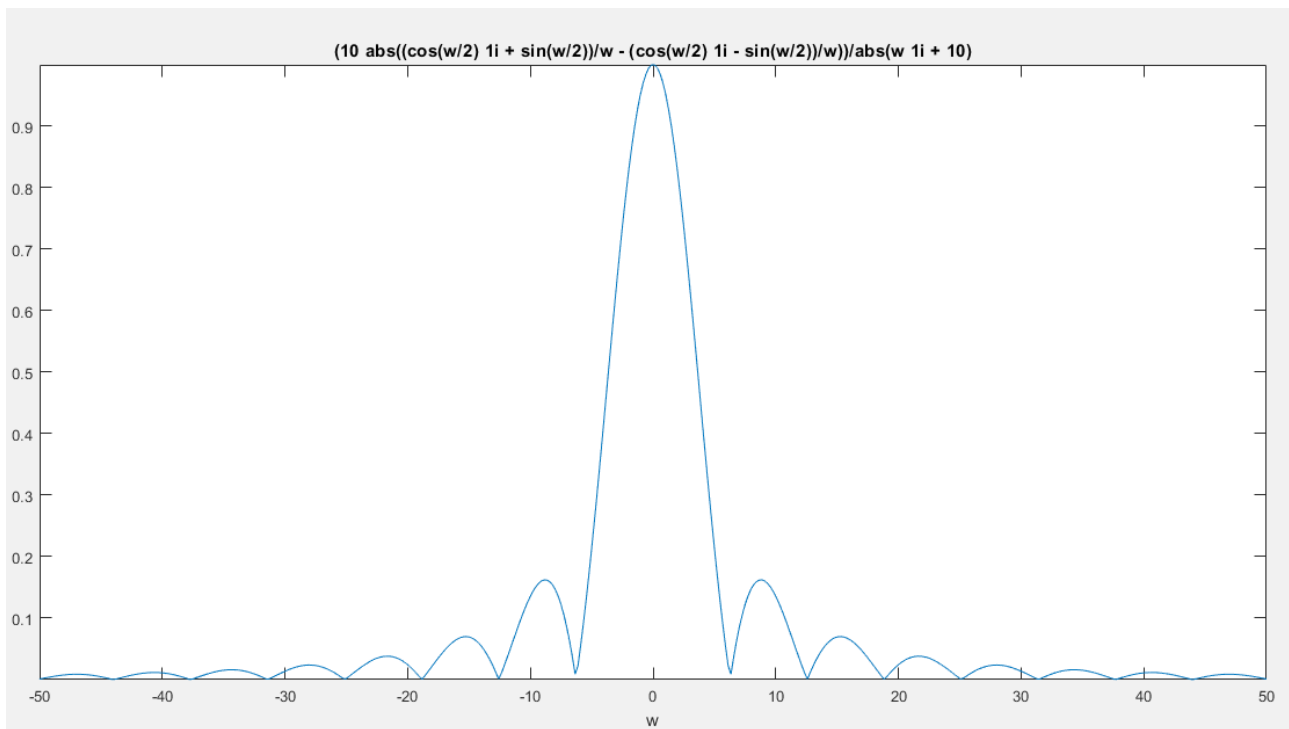(10 abs((cos(w/2) 1i + sin(w/2))/w - (cos(w/2) 1i - sin(w/2))/w))/abs(w 1i + 10)

```
syms t;
y=ifourier(Y,t);
ezplot(abs(y));
```


abs(2 π heaviside(t - 1/2) - 2 π heaviside(t + 1/2) - 2 π heaviside(t - 1/2) exp(-10 t) exp(5) + 2 π heaviside(t + 1/2) exp(-10 t) exp(-5))/(2 π)