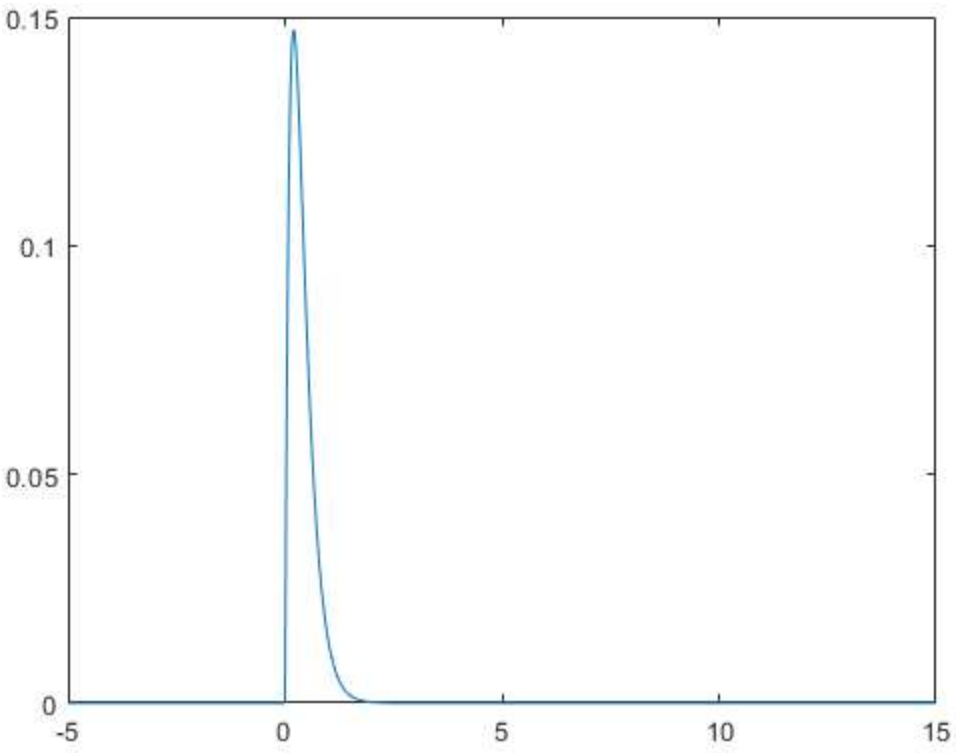
Contents


```
clc;
```

1.a

```
figure
t=-5:.01:15;
x = (2*t) .* exp(-5*t) .* heaviside(t);
plot(t,x)
```

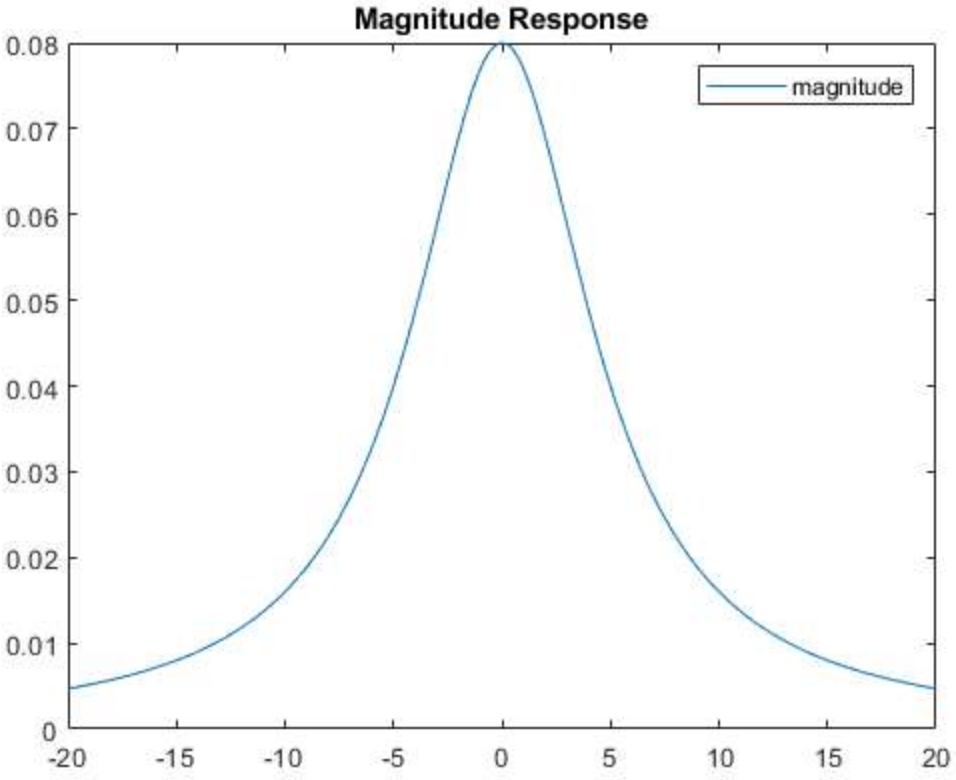


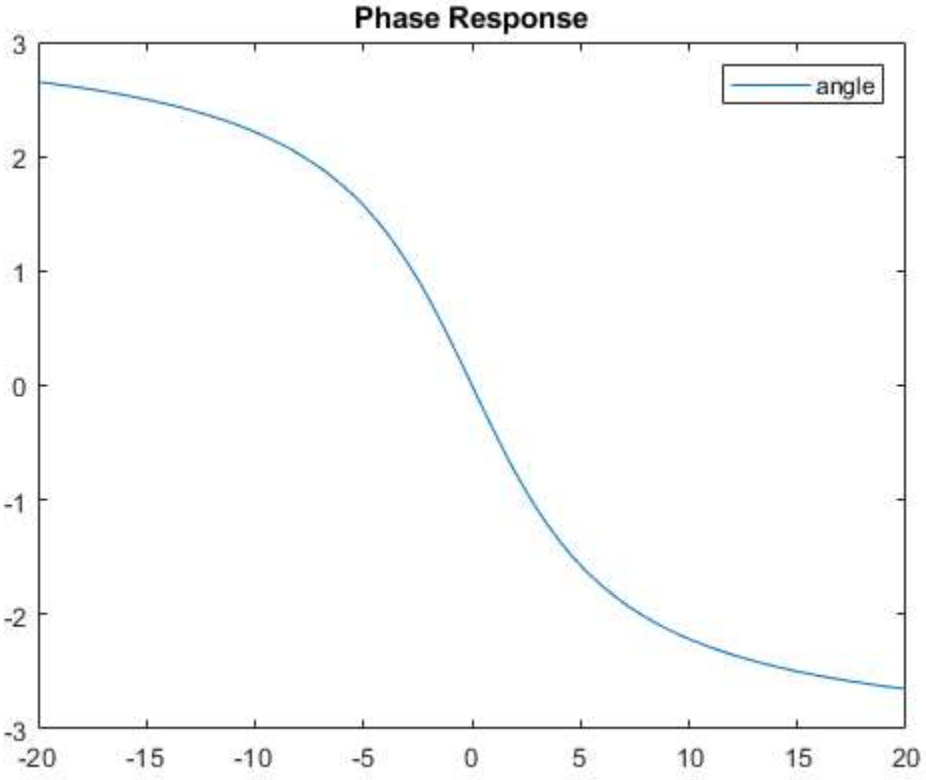
1.b

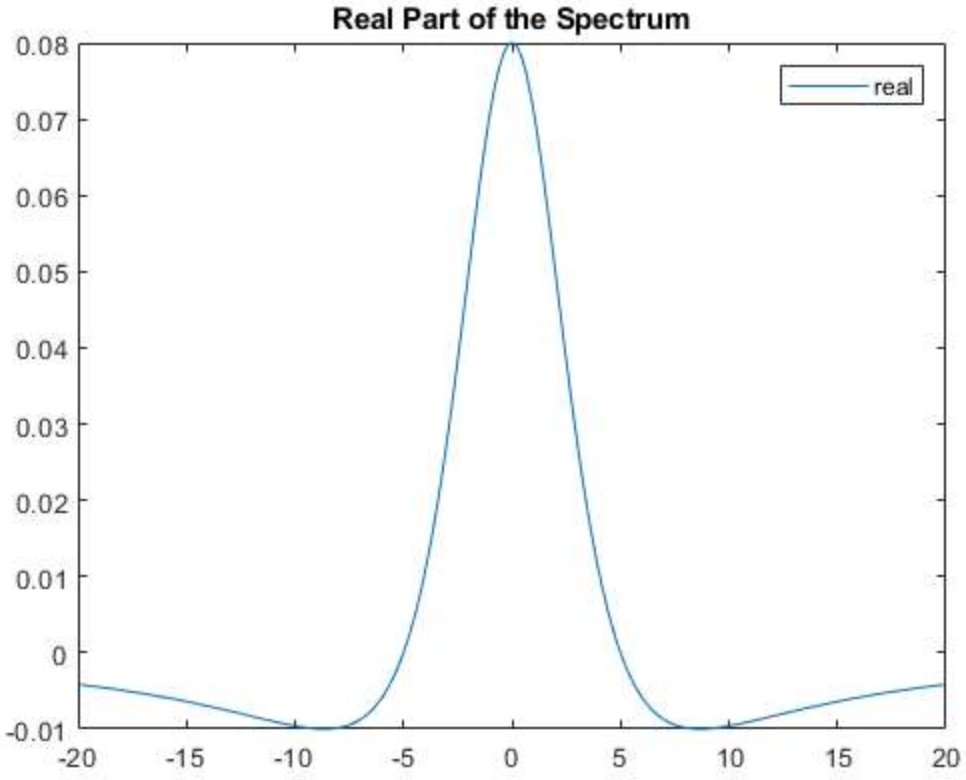
```
syms t w

x = (2*t) .* exp(-5*t) .* heaviside(t);
X = fourier(x, w) % CTFT result

% Interval Definition
w=-20:.1:20;
X=subs(X,w);

% Magnitude Response
plot(w,abs(X));
```

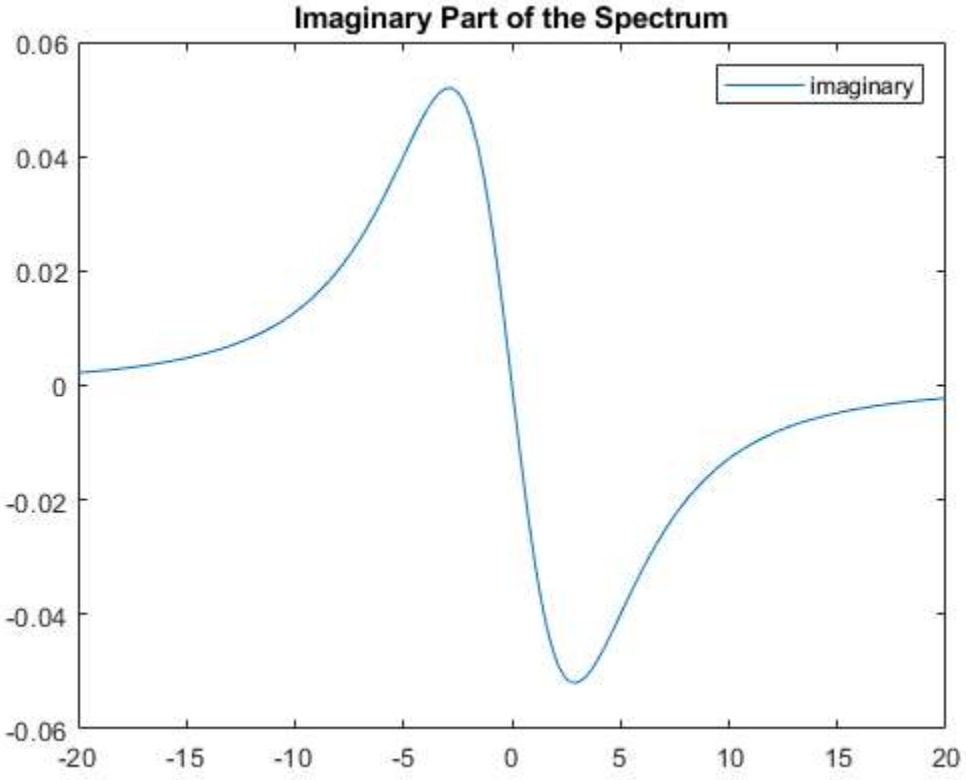
```
title("Magnitude Response")
legend('magnitude')

% Phase Response
figure
plot(w,angle(X));
title("Phase Response")
legend('angle')

% Real Part of the Spectrum
figure
plot(w,real(X))
title("Real Part of the Spectrum")
legend('real')

% Imaginary Part of the Spectrum
figure
plot(w,imag(X))
title("Imaginary Part of the Spectrum")
legend('imaginary')
```

```
X =

2/(5 + w*1i)^2
```


Magnitude Response
magnitude
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-20
-15
-10
-5
0
5
10
15
20


Phase Response
angle
3
2
1
0
-1
-2
-3
-20
-15
-10
-5
0
5
10
15
20

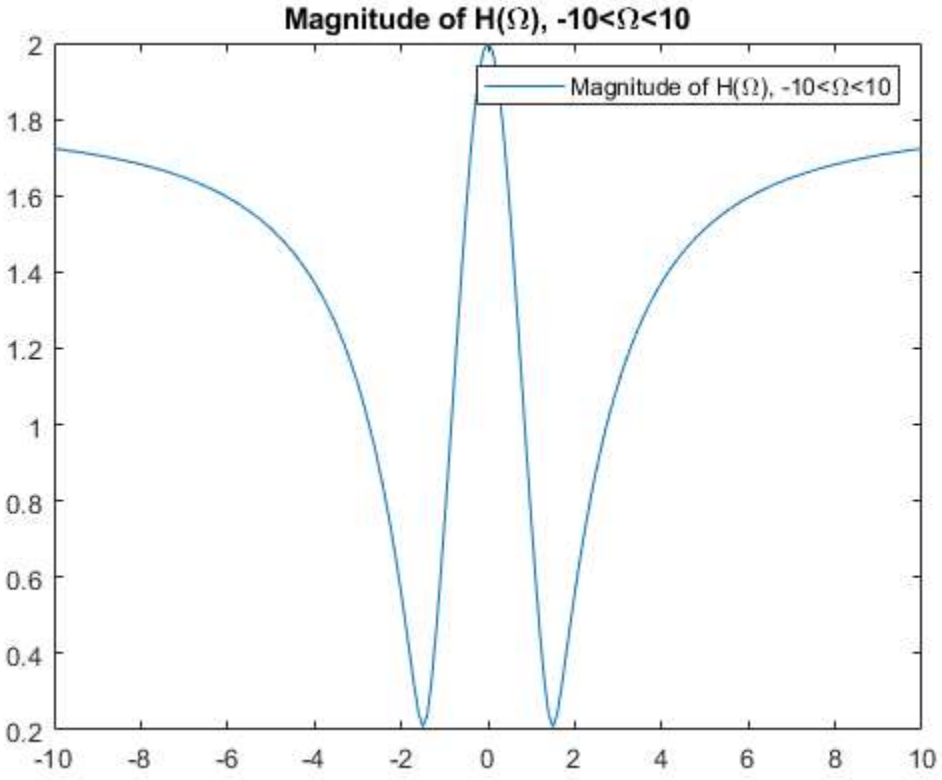


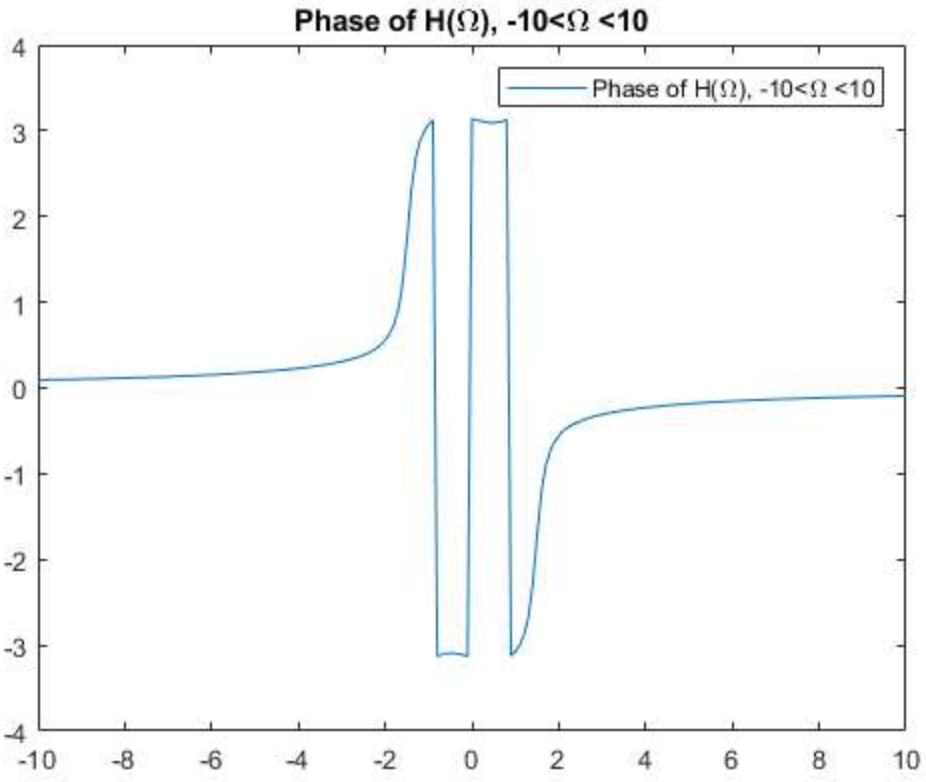


2

```
numerator = [9 3 20];
denominator = [5 -3 -10];
w = -10:.1:10;

H = freqs(numerator,denominator,w);

figure
```

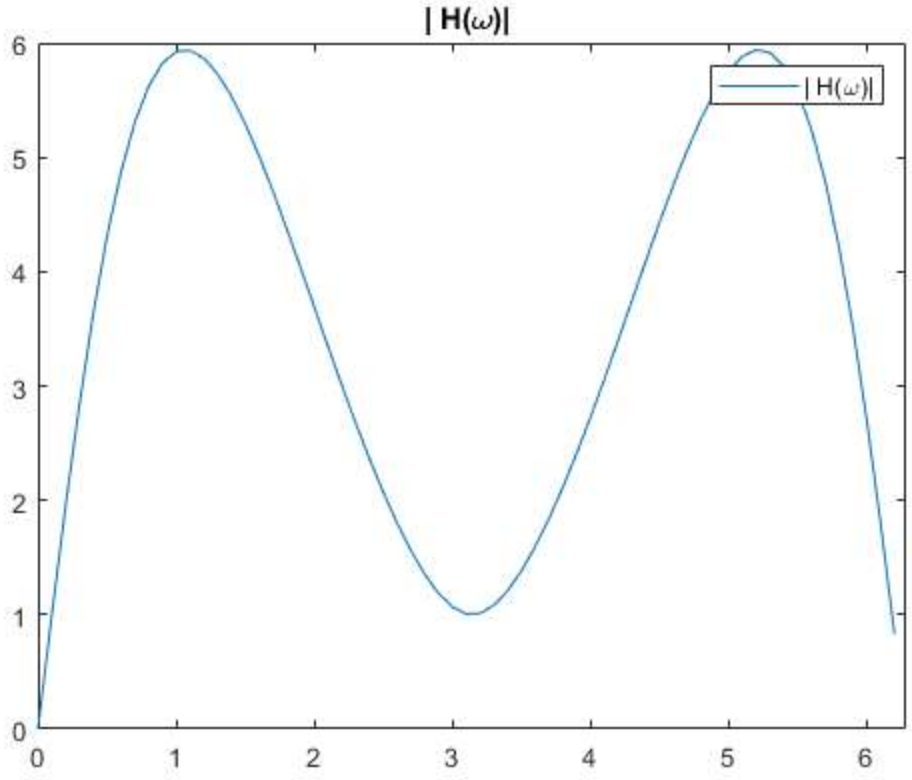
```
plot(w,abs(H));
title('Magnitude of H(\Omega), -10<\Omega<10')
legend('Magnitude of H(\Omega), -10<\Omega<10')

figure
plot(w,angle(H));
title('Phase of H(\Omega), -10<\Omega <10')
legend('Phase of H(\Omega), -10<\Omega <10')
```

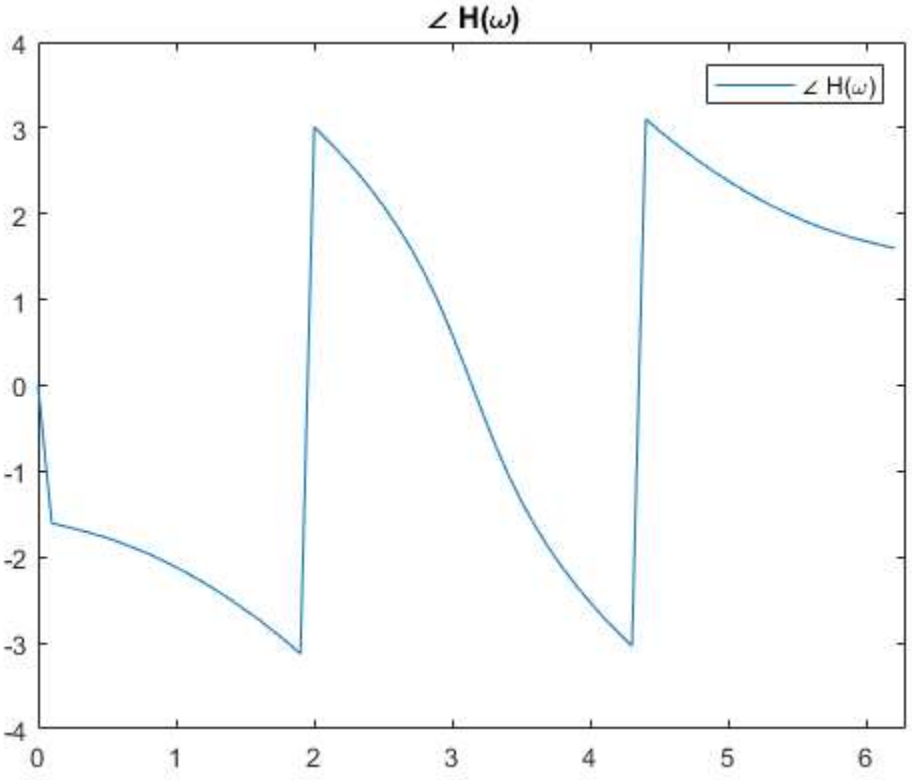




3

```
numerator = [2 7 0 -9];
denominator = [1 -3];
w = 0:.1:2*pi;

H = freqz(numerator, denominator, w);

figure
plot(w, abs(H))
title('| H(\omega)| ')
legend('| H(\omega)| ')
xlim([0 2*pi])

figure
plot(w,angle(H))
title('\angle H(\omega)')
xlim([0 2*pi])
legend('\angle H(\omega)')
```





4

```
numerator = [1 5 6];
denominator = [1 5 2 8];

H = tf(numerator, denominator);
zpk(H)
```

```
ans =

             (s+3) (s+2)
  ---------------------------------
  (s+4.924) (s^2 + 0.07621s + 1.625)

Continuous-time zero/pole/gain model.
```

5

```
numerator = [1 4 4];
denominator = [1 -3 2];

H = tf(numerator, denominator, 0.5);
zpk(H)
```

```
ans =

    (z+2)^2
  -----------
  (z-2) (z-1)

Sample time: 0.5 seconds
Discrete-time zero/pole/gain model.
```

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