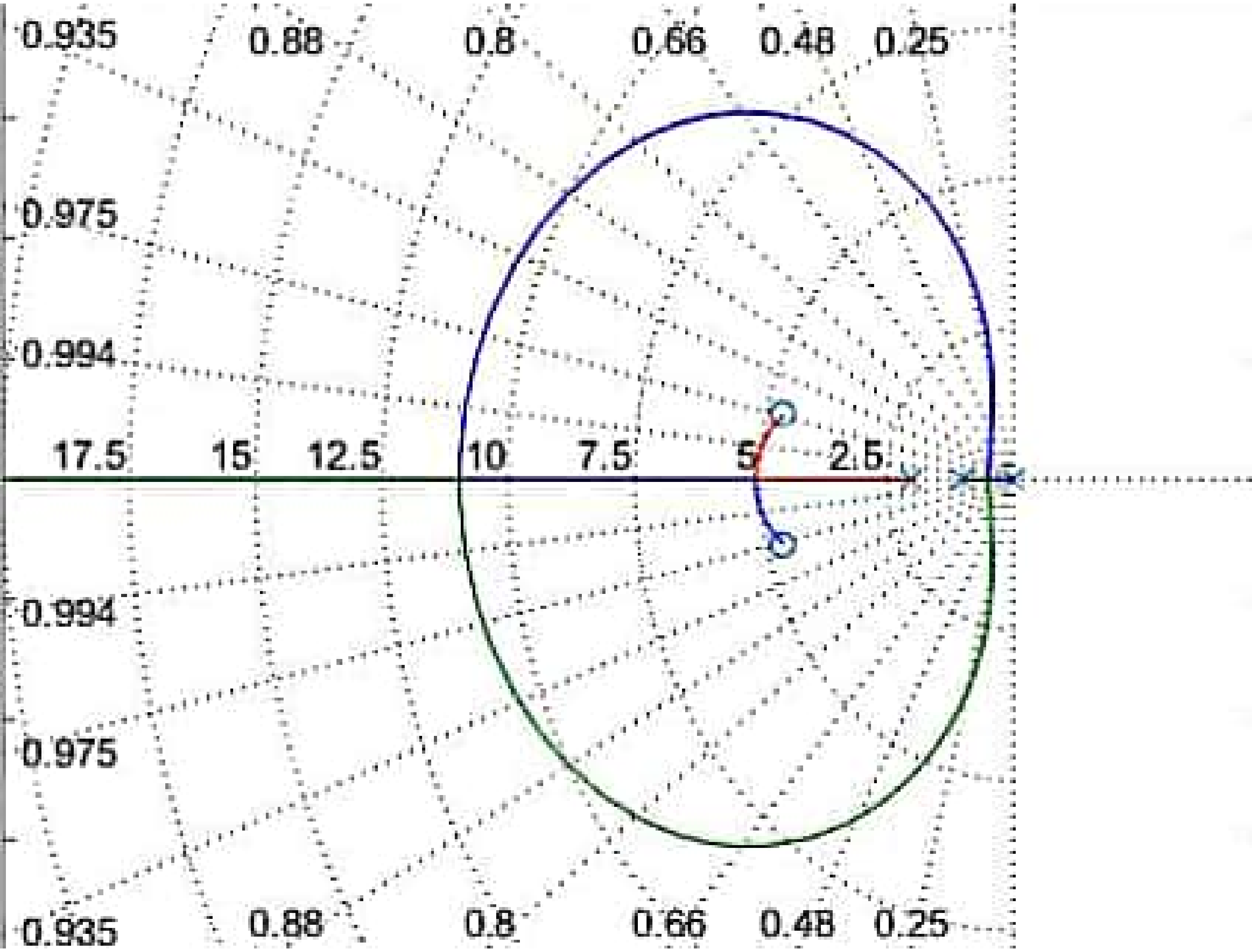
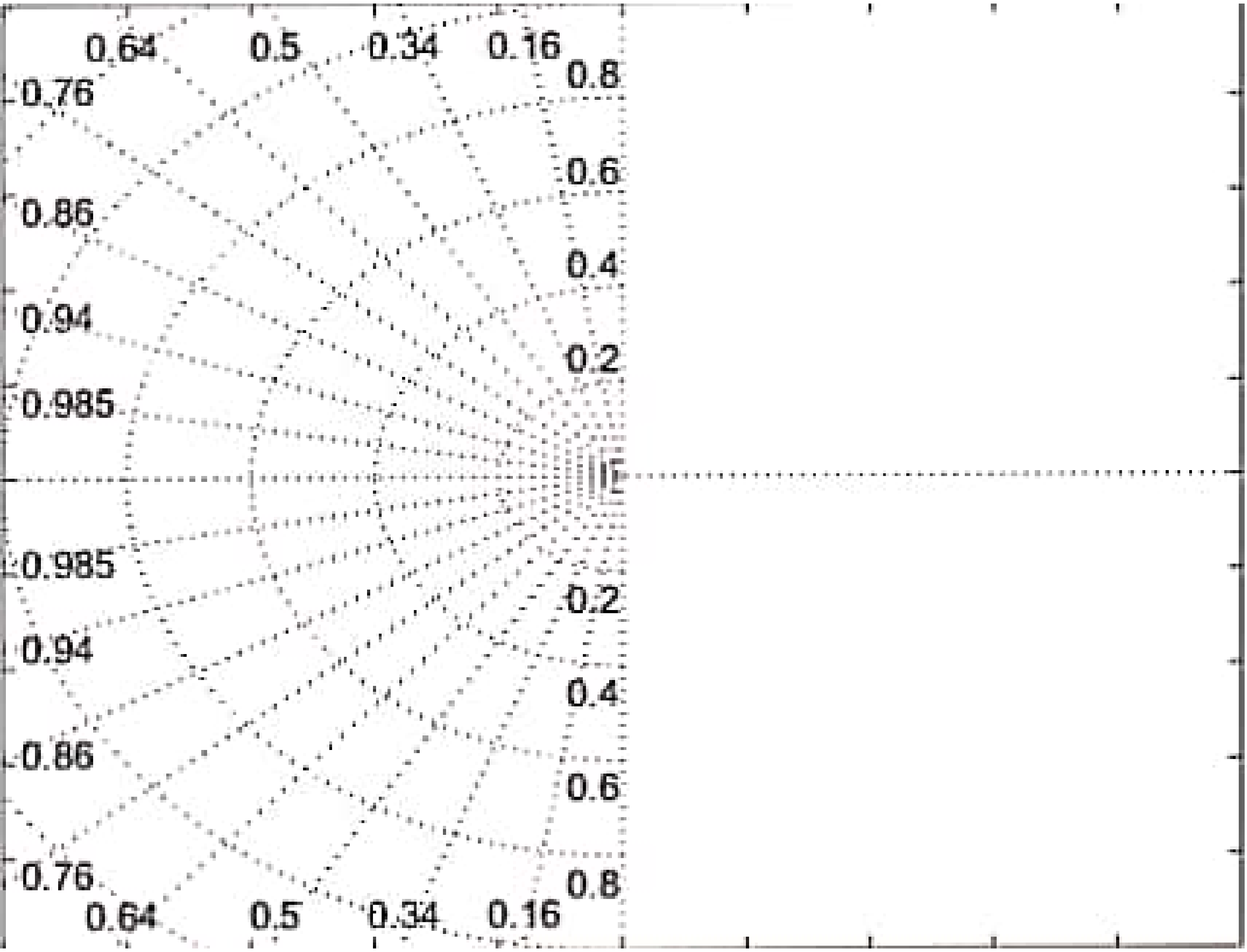
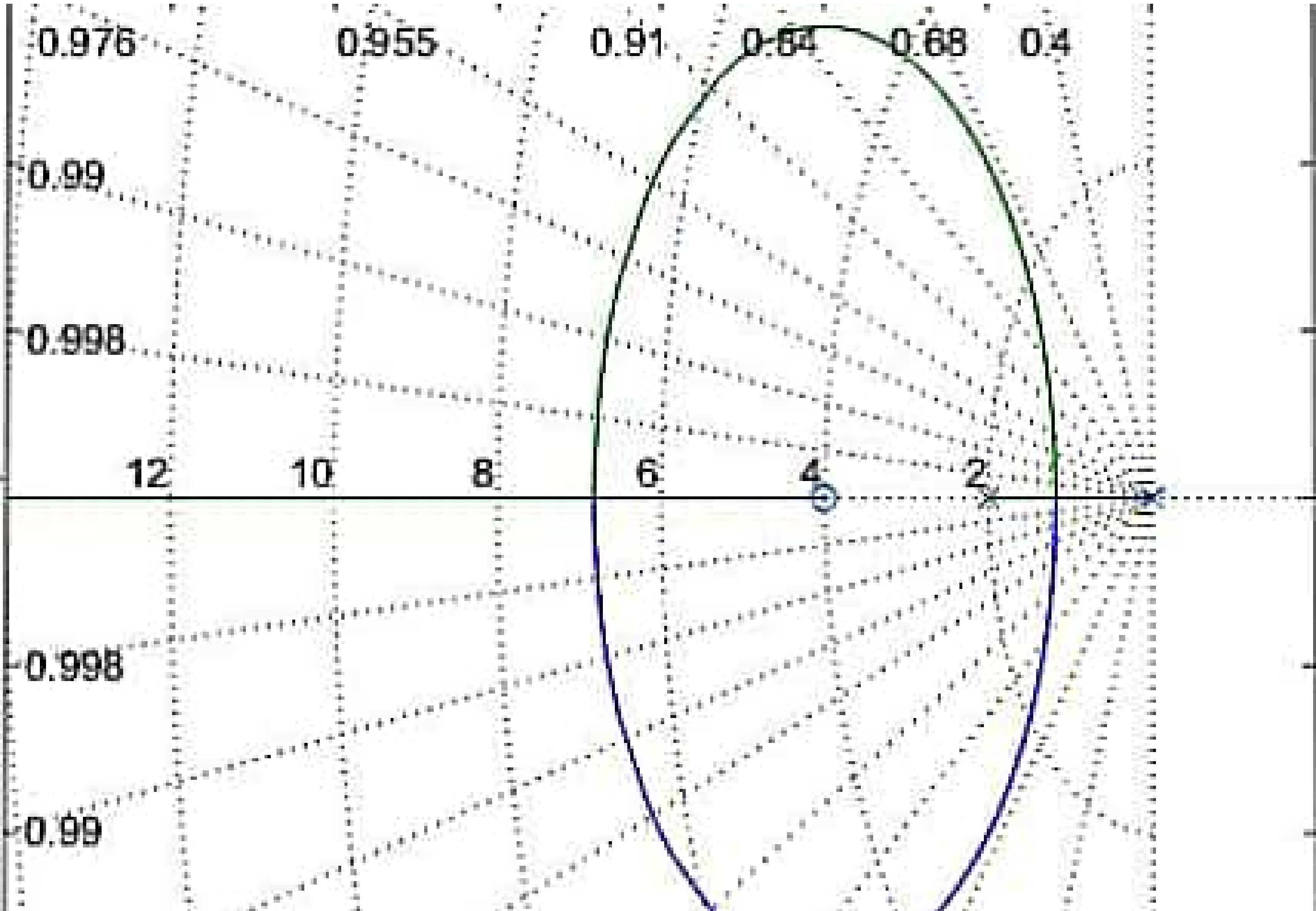
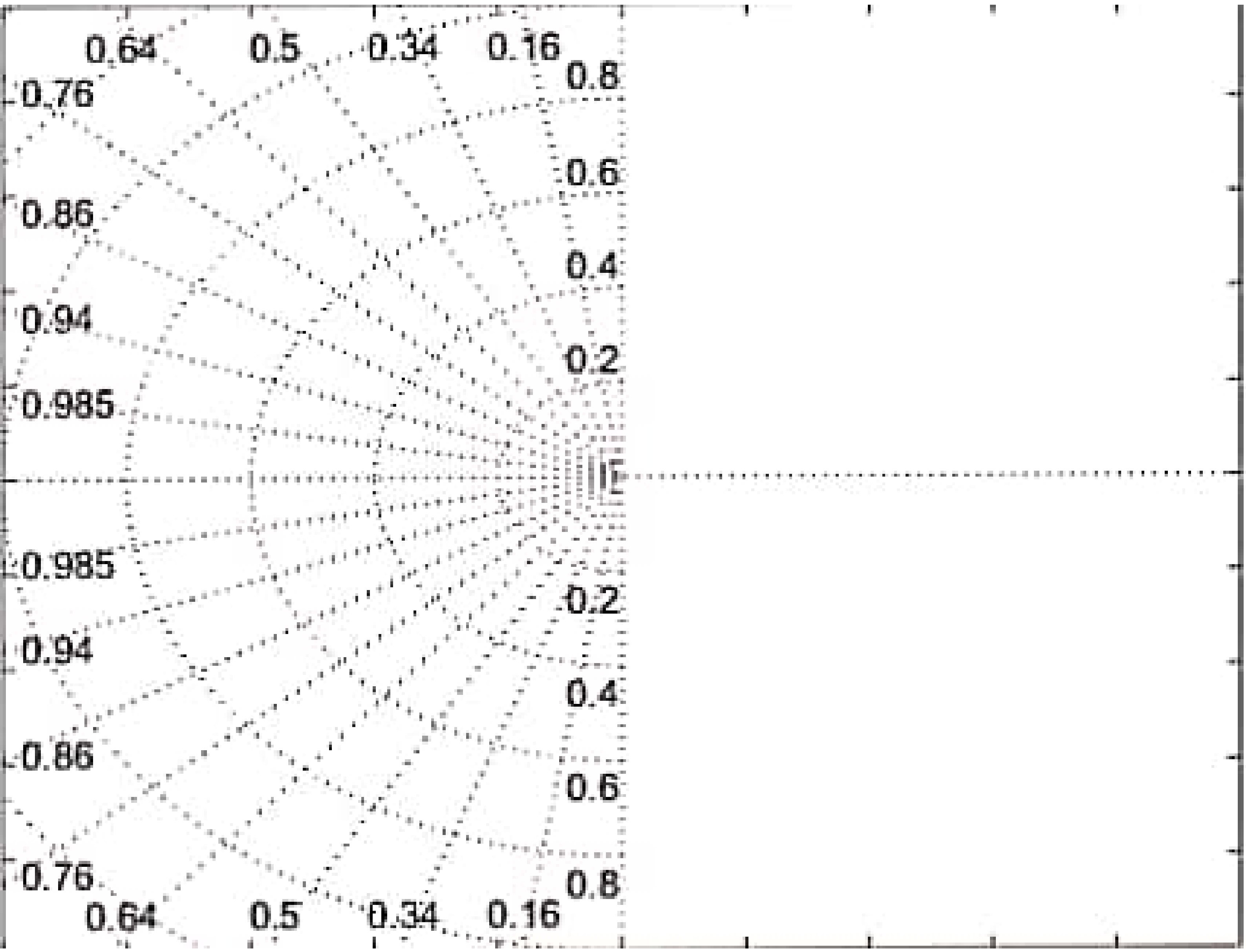
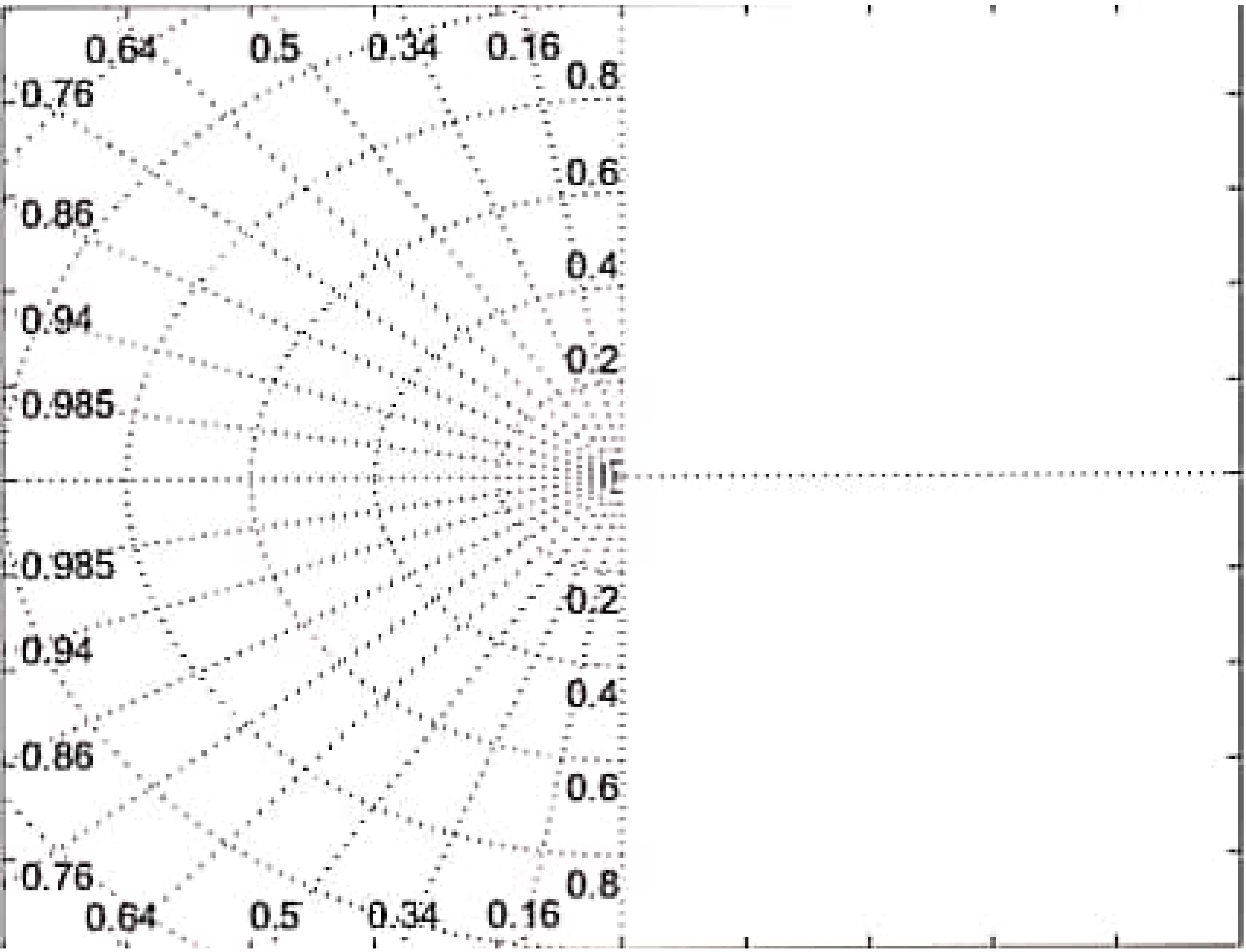

0.935
0.88
0.8
0.66
0.48
0.25
0.975
0.994
17.5
15
12.5
10
7.5
5
2.5
0.994
0.975
0.935
0.88
0.8
0.66
0.48
0.25


0.64
0.5
0.34
0.16
0.8
0.76
0.6
0.86
0.4
0.94
0.2
0.985
0.985
0.2
0.94
0.4
0.86
0.6
0.76
0.8
0.64
0.5
0.34
0.16


0.976
0.955
0.91
0.84
0.68
0.4
0.99
0.998
12
10
8
6
4
2
0.998
0.99
0.976
0.955
0.91
0.84
0.68
0.4


0.64
0.5
0.34
0.16
0.8
0.76
0.6
0.86
0.4
0.94
0.2
0.985
0.985
0.2
0.94
0.4
0.86
0.6
0.76
0.8
0.64
0.5
0.34
0.16


0.64
0.5
0.34
0.16
0.8
0.76
0.6
0.86
0.4
0.94
0.2
0.985
0.985
0.2
0.94
0.4
0.86
0.6
0.76
0.8
0.64
0.5
0.34
0.16

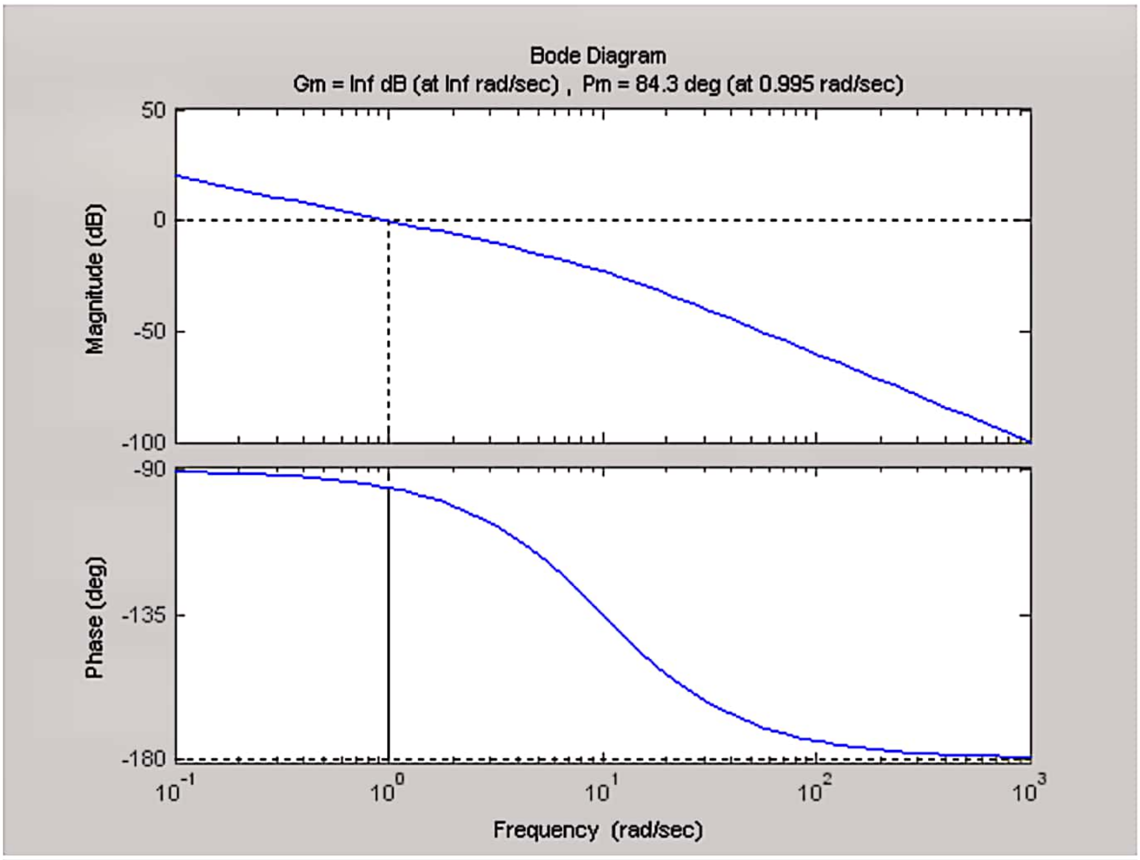
```
% Program for root locus:-(Addition of open loop poles)
% G(s)*H(s)=10/(s*(s+2))
p=[0 0 0];
q=[1 2 0];
sys=tf(p,q);
zpk(sys)
figure(1)
rlocus(sys)
grid
title('ROOT LOCUS PLOT OF 10/(S*S+2))')

% G(s)*H(s)=10/(s*(s+2)*(s+4))
p=[0 0 0];
q=[1 5 8 0];
sys=tf(p,q);
zpk(sys)
figure(2)
rlocus(sys)
grid
title('ROOT LOCUS PLOT OF 10/(S*(S+2)*(s+4)')

% G(s)*H(s)=10/(s*(s+2)*(s+4)*(s+6))
p=[0 0 0];
q=[1 11 44 48 0];
sys=tf(p,q);
zpk(sys)
figure(3)
rlocus(sys)
grid
title('ROOT LOCUS PLOT OF 10/(S*(S+2)*(s+4)*(s+6)')
```

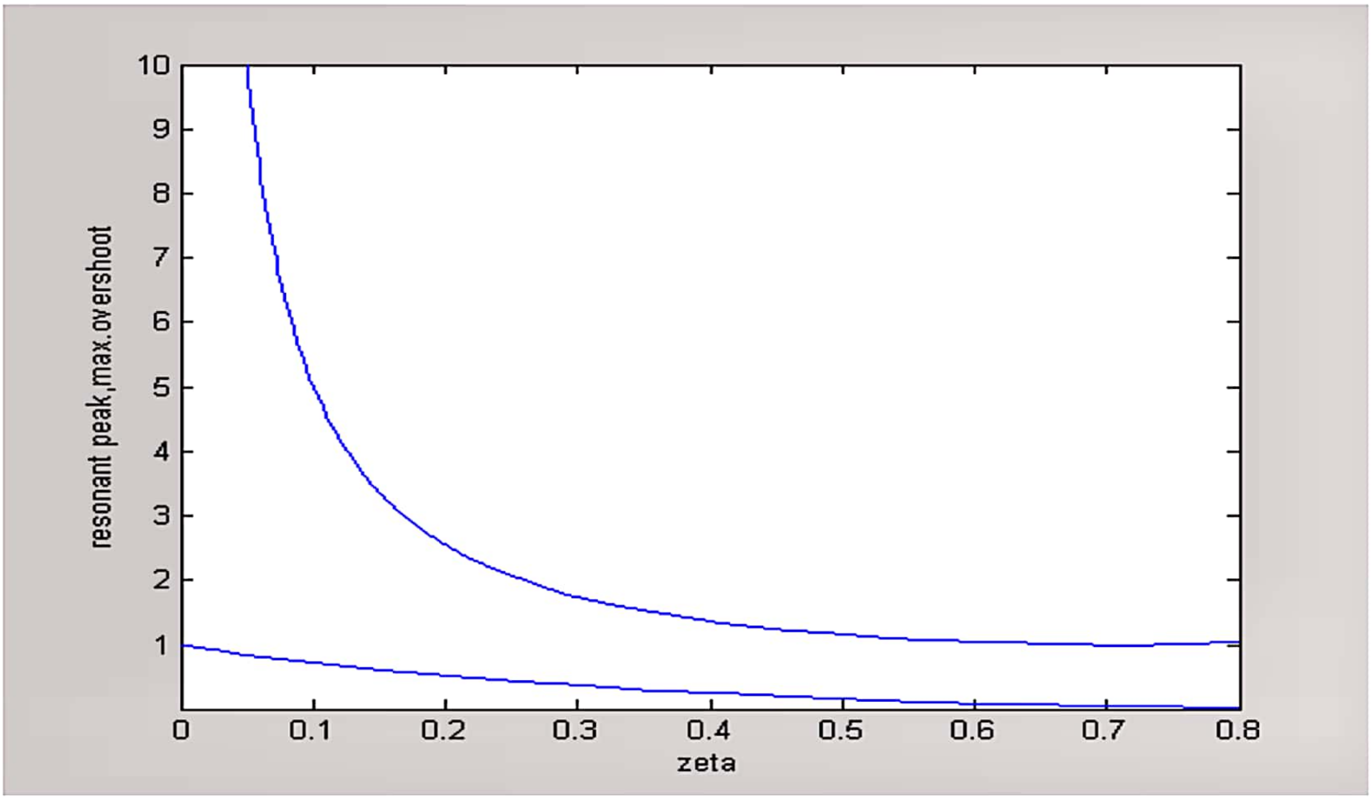
```
% G(s)*H(s)=10/(s*(s+2)*(s+4)*(s+6))
p=[0 0 0];
q=[1 11 44 48 0];
sys=tf(p,q);
zpk(sys)
figure(3)
rlocus(sys)
grid
title('ROOT LOCUS PLOT OF 10/(S*(S+2)*(s+4)*(s+6)')

% Program for root locus:-(Addition of open loop zeros)
% G(s)*H(s)=(11*(s+4))/(s*(s+2))
p=[0 11 44];
q=[1 2 0];
sys=tf(p,q);
zpk(sys)
figure(4)
rlocus(sys)
grid
title('ROOT LOCUS PLOT OF (10*(s+4))/(S*S+2))')

% G(s)*H(s)=(10*(s+4)*(s+6))/(s*(s+2))
p=[0 11 100 240];
q=[1 3 2 0];
sys=tf(p,q);
zpk(sys)
figure(5)
rlocus(sys)
grid
title('ROOT LOCUS PLOT OF (10*(s+4)*(s+6))/(S*S+2))')
```

```
% Effect of addition of poles to closed loop TF
p=[1 8 10 20];
wn=input('Enter value of wn=');
zeta=input('enter value of zeta=');
S=tf('s');
for i=1:4
    num= wn^2*p(i);
    den=[1 p(i)+2*zeta*wn wn^2+2*zeta*wn*p(i) p(i)*wn^2];
    G=tf(num,den);
    subplot(2,2,1)
    figure(i)
    step(G)
    stepinfo(G)

end
```

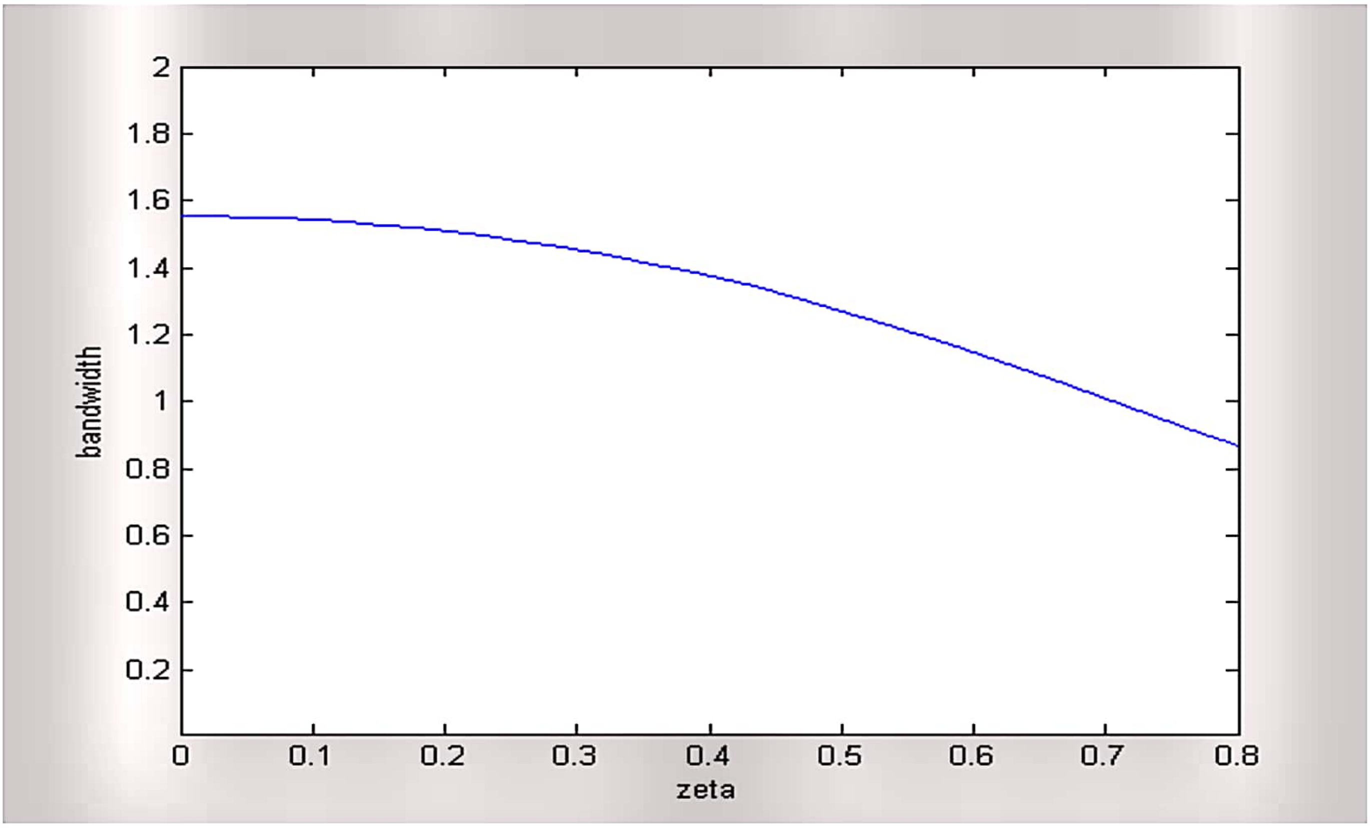
```
% Effect of addition of zeros to closed loop TF
p=[1 8 10 20];
wn=input('Enter value of wn=');
zeta=input('enter value of zeta=');
s=tf('s');
for i=1:4
    num= [wn^2 wn^2*z(i)];
    den=[z(i) 2*zeta*wn*z(i)  z(i)*wn^2];
    G=tf(num,den);
    subplot(2,2,1)
    figure(i)
    step(G)
    stepinfo(G)

end
```

```
% RELATIONSHIP BETWEEN FREQUENCY RESPONSE AND TRANSIENT RESPONSE
clc;
s=poly(0,'s');
F=syslin('c',(1/(0.1*s^2+s)));
fmin=0.1;
fmax=100;
bode(F,fmin,fmax); %% Plot s frequency response of open loop
show_margin(OL) %% Display GM,PM,Cross over frequency
```

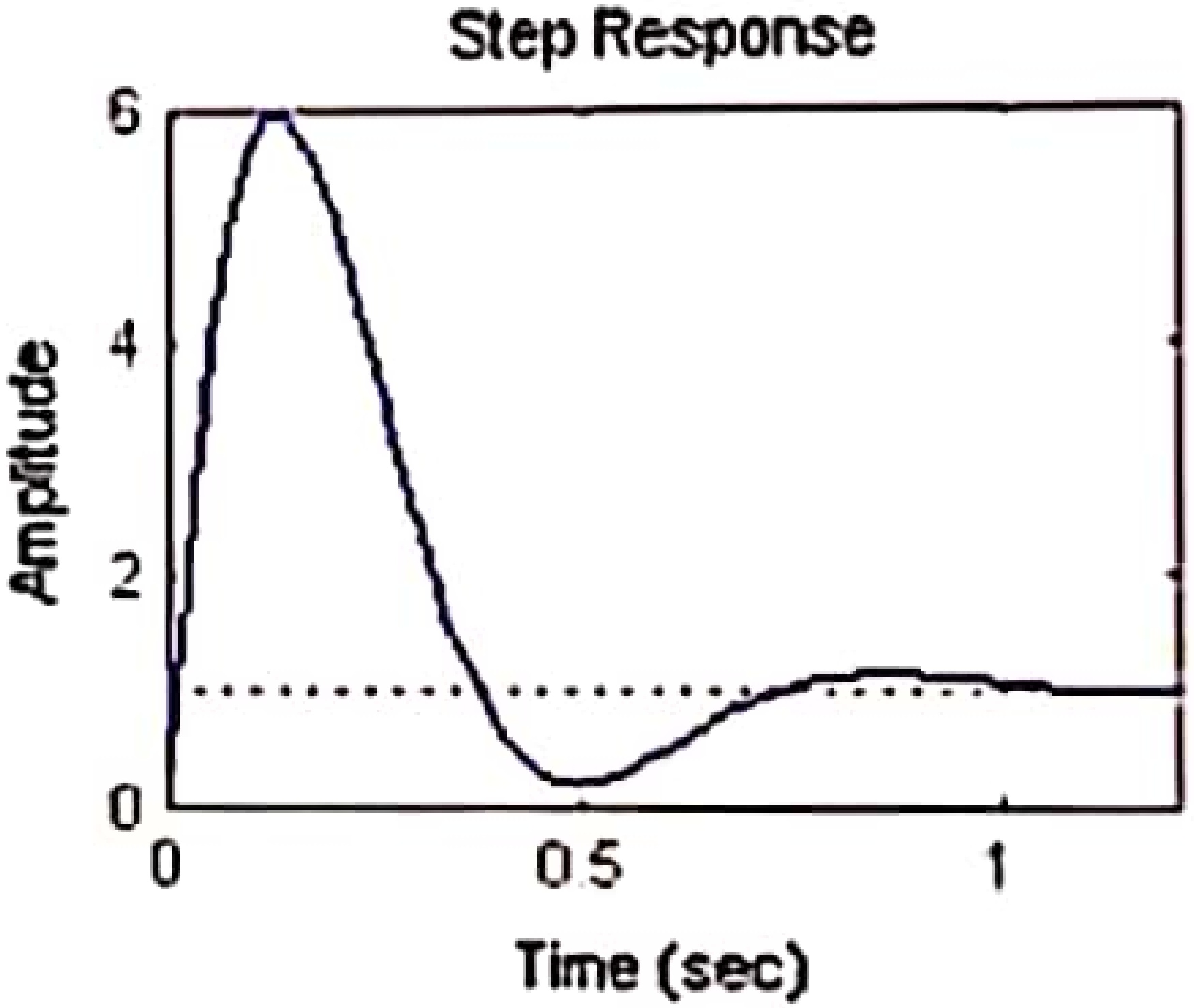

Bode Diagram
Gm = Inf dB (at Inf rad/sec) , Pm = 84.3 deg (at 0.995 rad/sec)
50
0
-50
-100
Magnitude (dB)
-90
-135
-180
Phase (deg)
10^-1
10^0
10^1
10^2
10^3
Frequency (rad/sec)

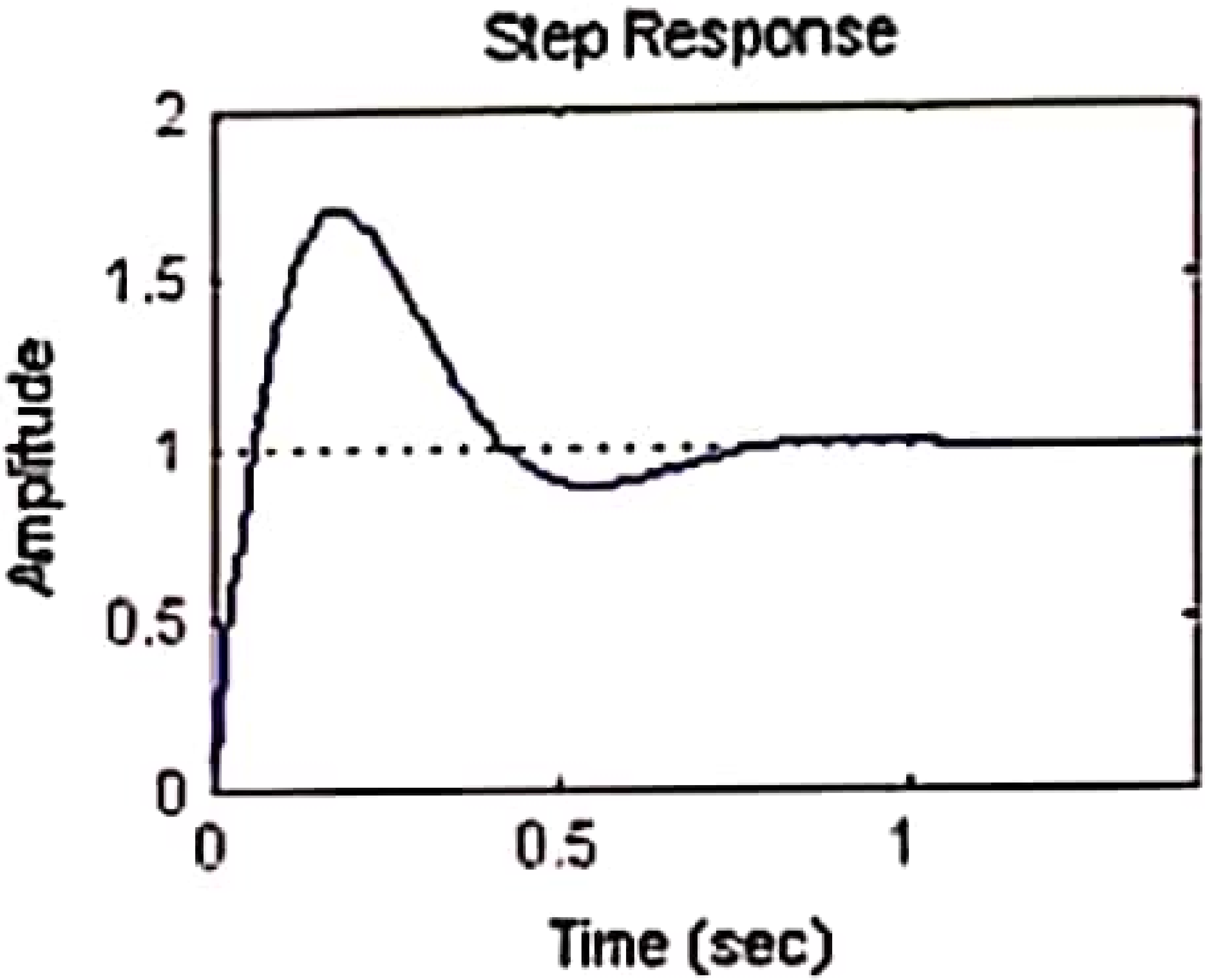


10
9
8
7
6
5
4
3
2
1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
zeta
resonant peak,max.overshoot

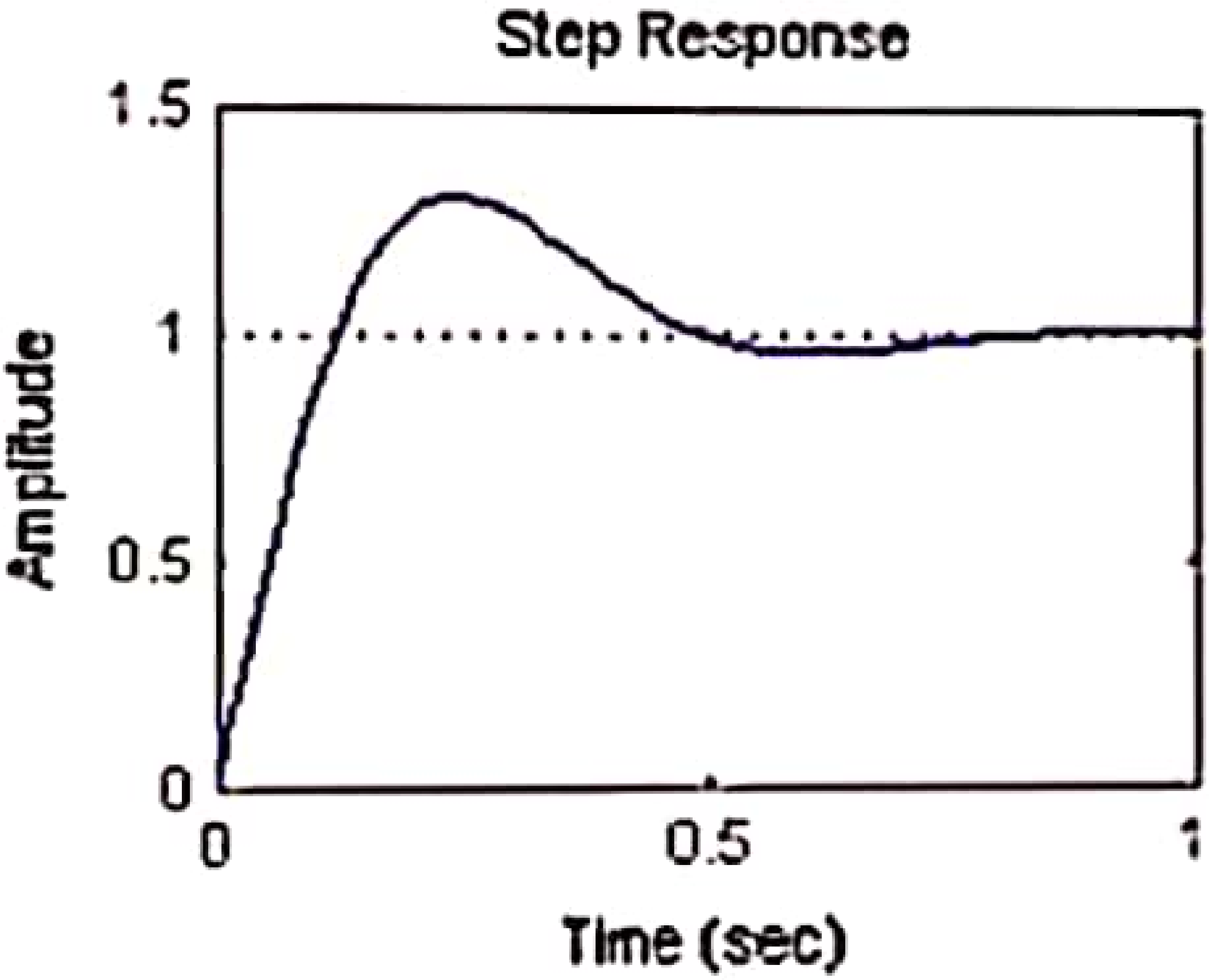


bandwidth
zeta
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8

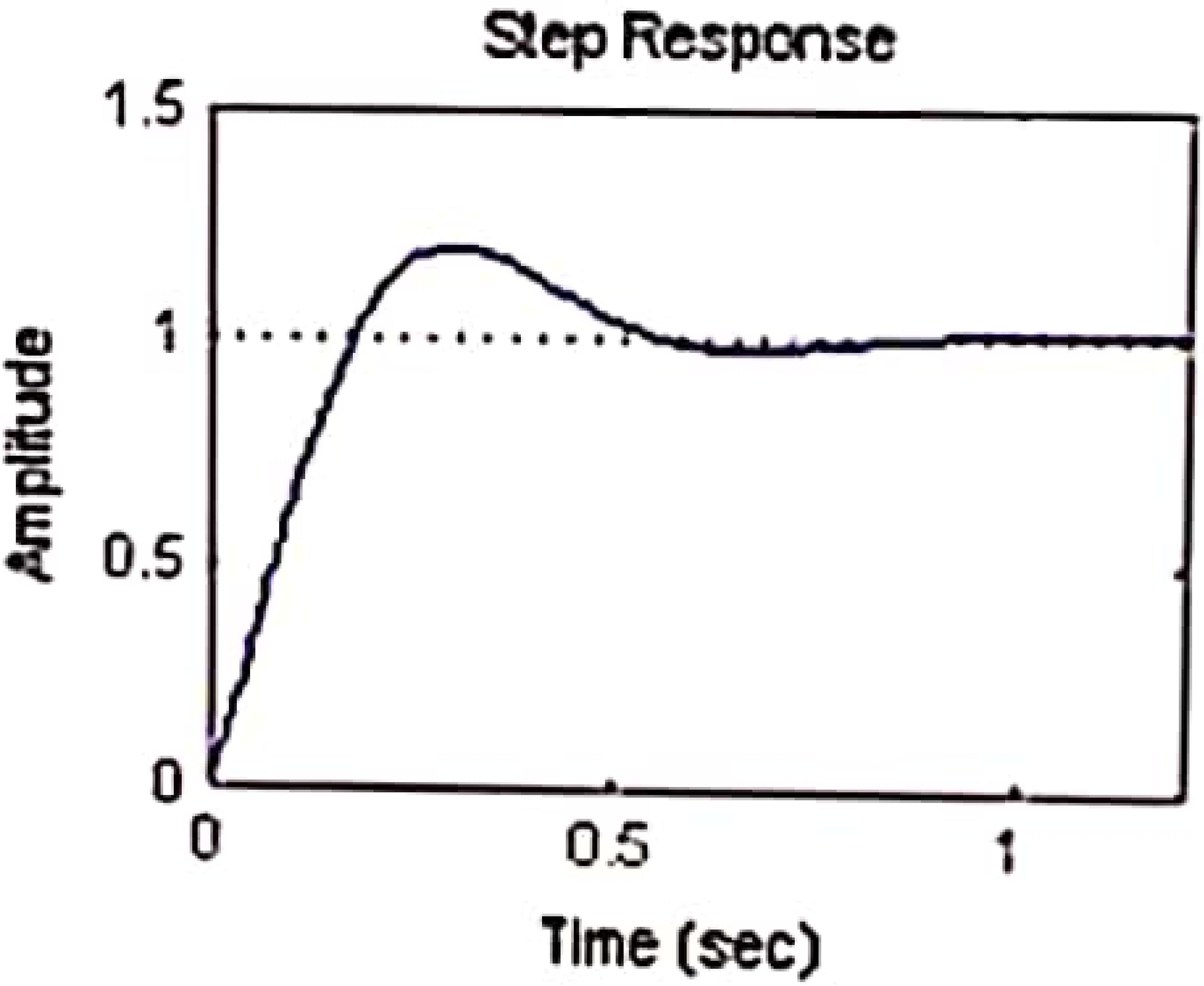

Step Response
Amplitude
Time (sec)
6
4
2
0
0
0.5
1



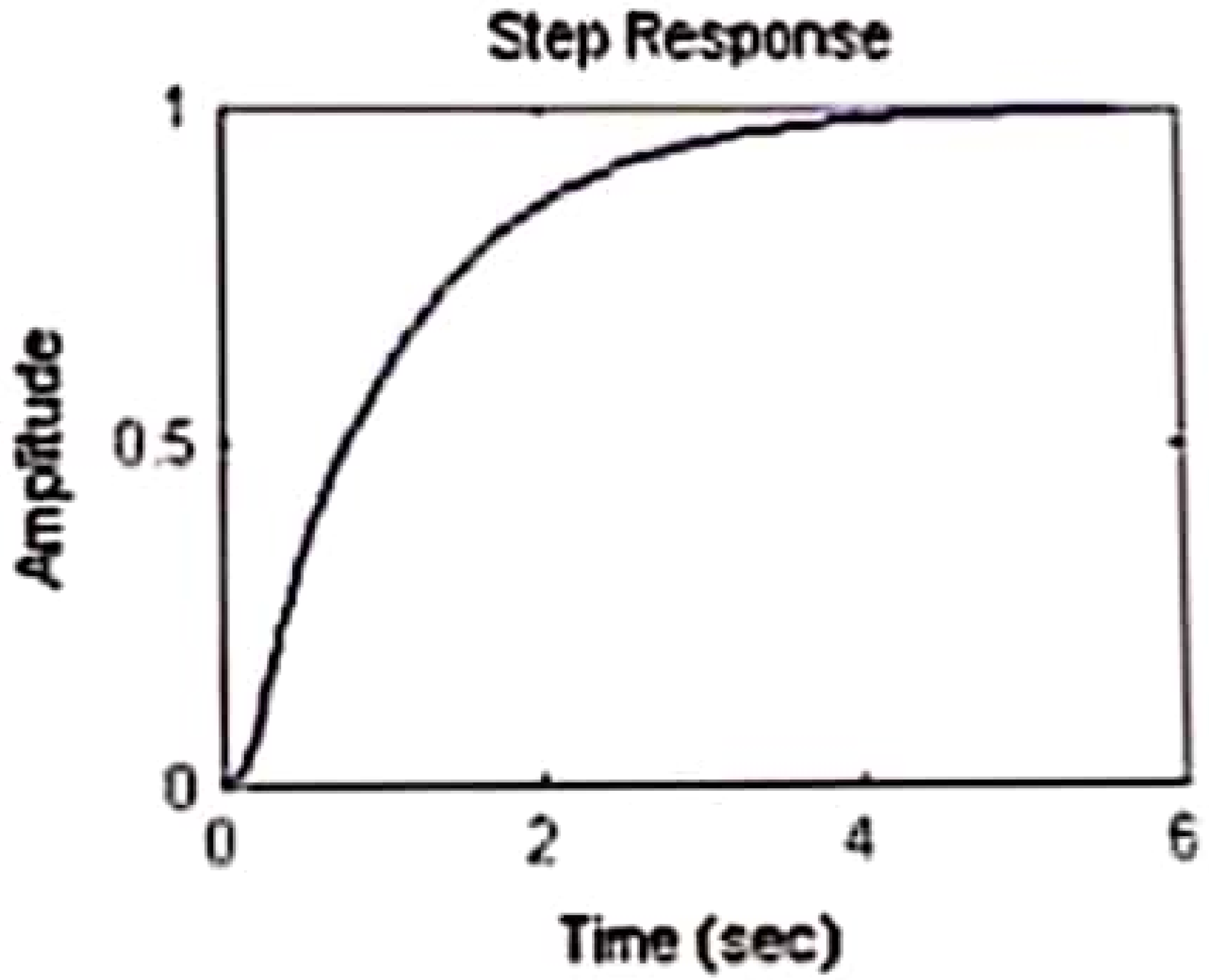
Step Response
Amplitude
Time (sec)
2
1.5
1
0.5
0
0
0.5
1

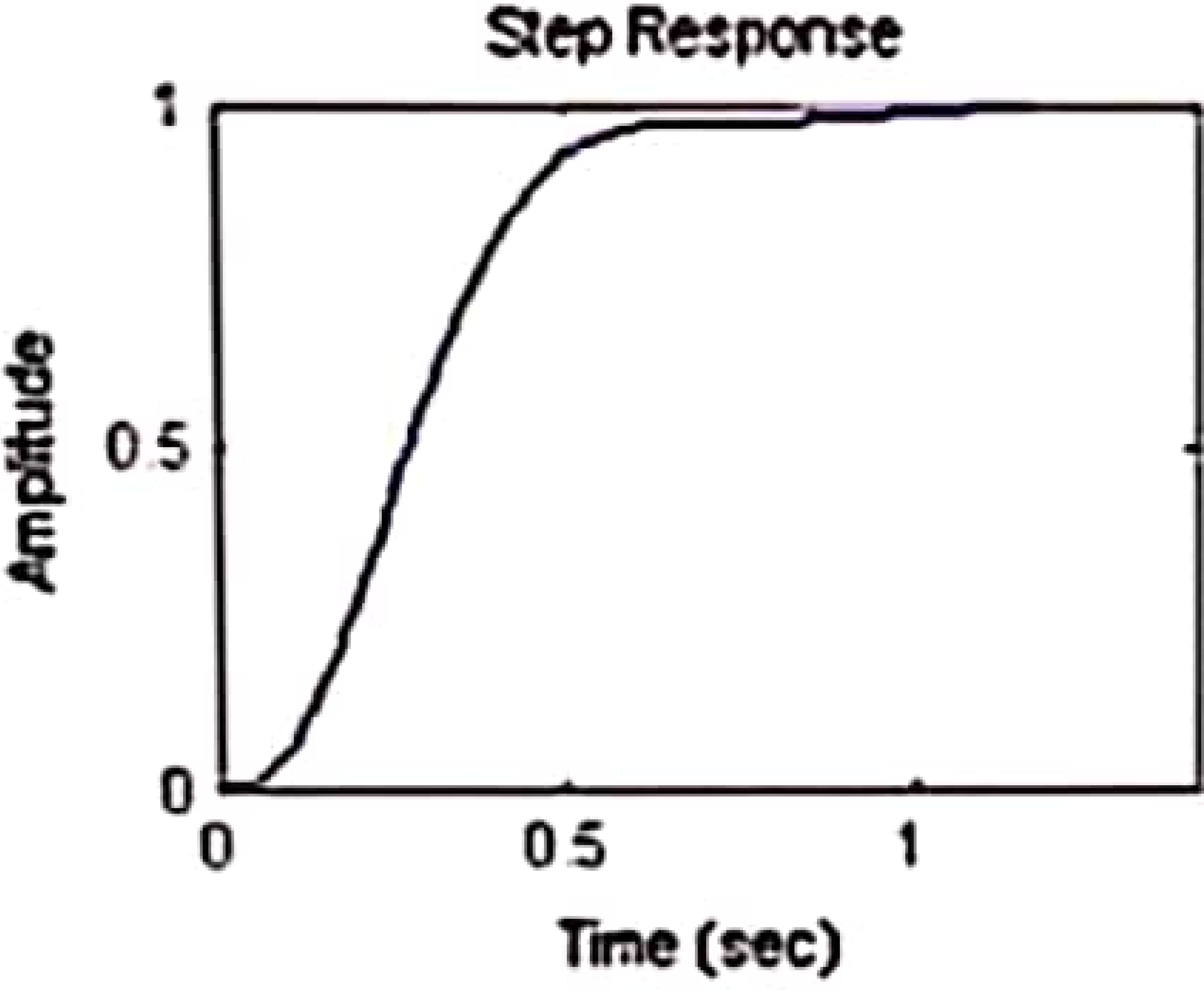


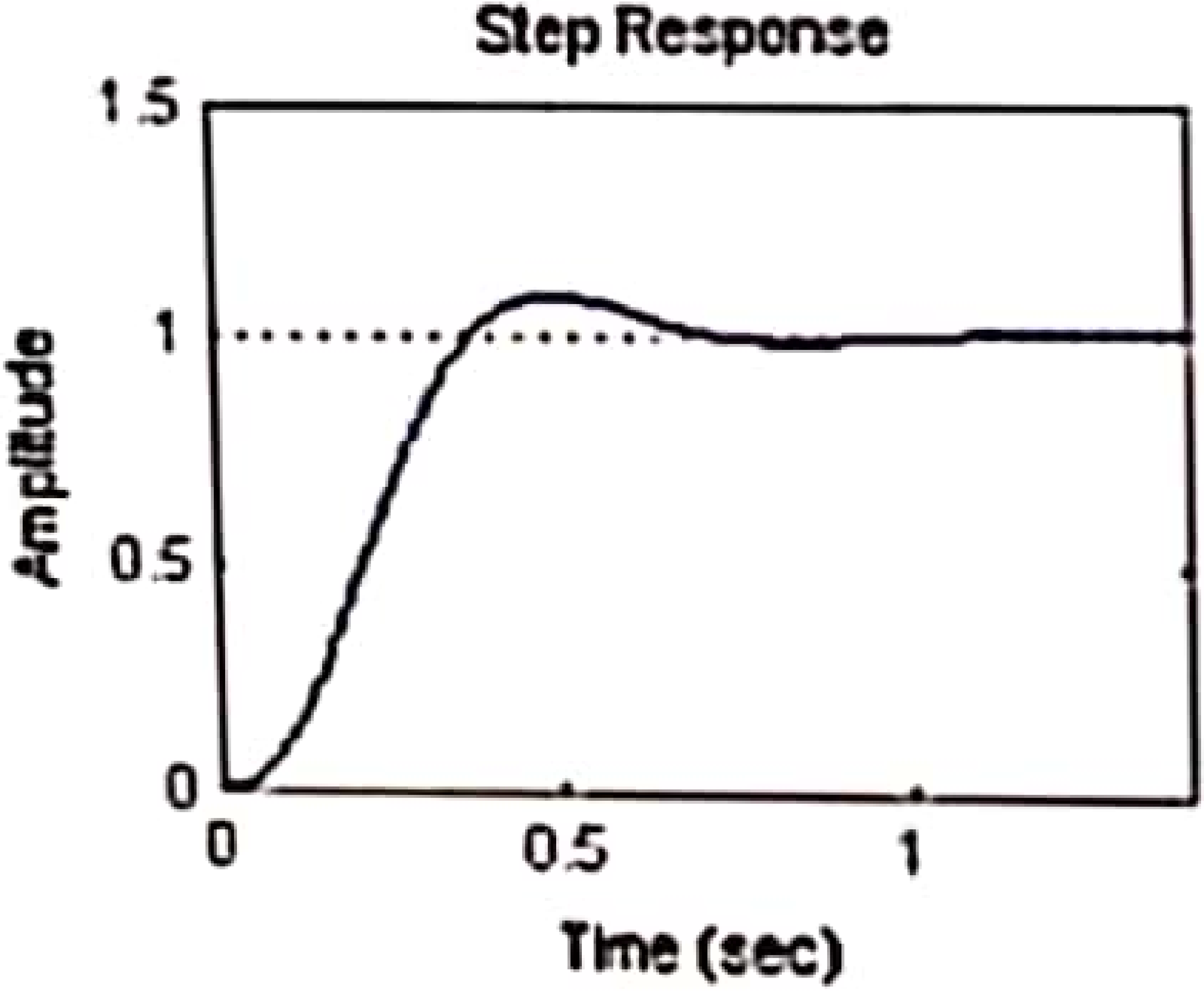
Step Response
1.5
1
0.5
0
Amplitude
0
0.5
1
Time (sec)

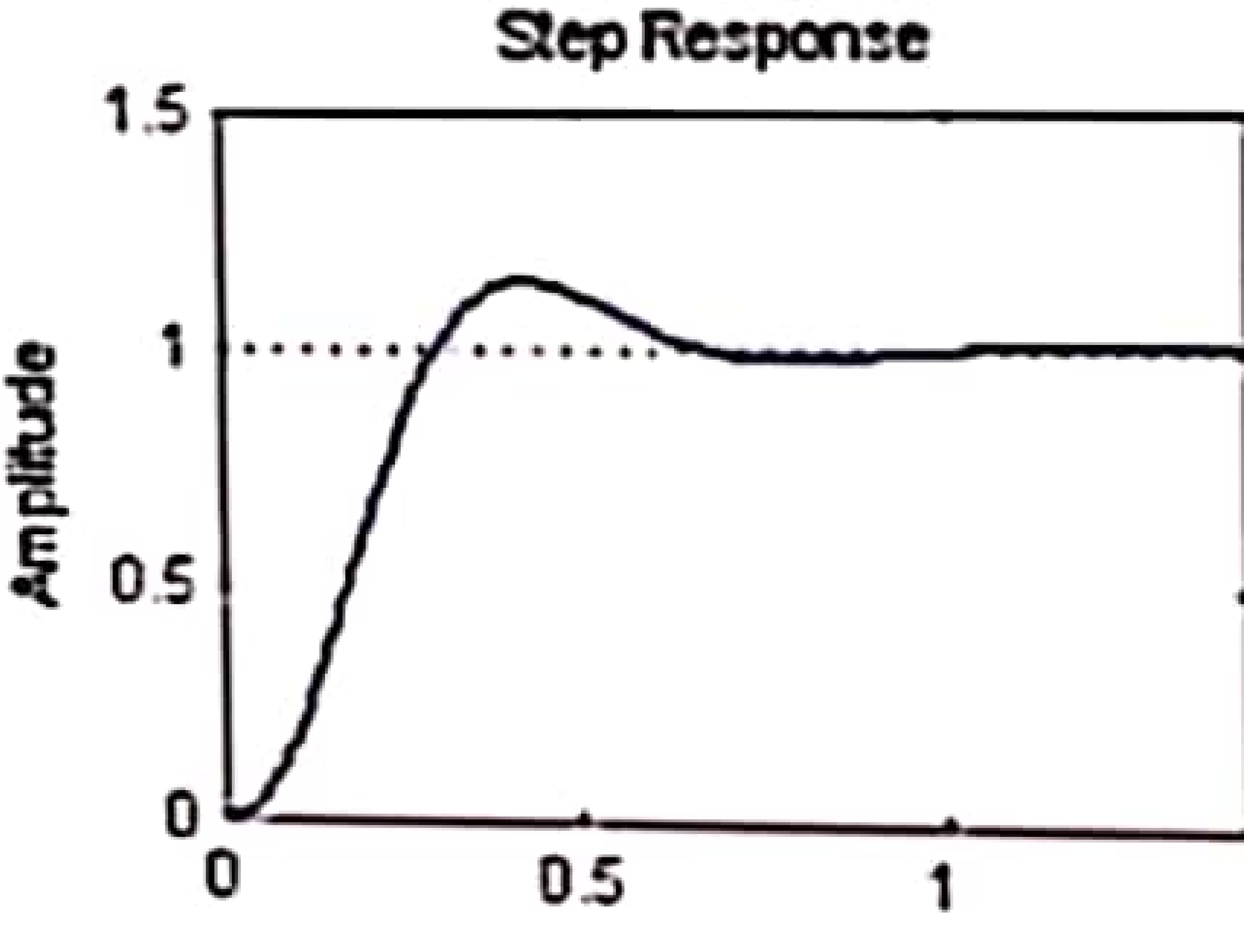


Step Response
1.5
1
0.5
0
Amplitude
0
0.5
1
Time (sec)

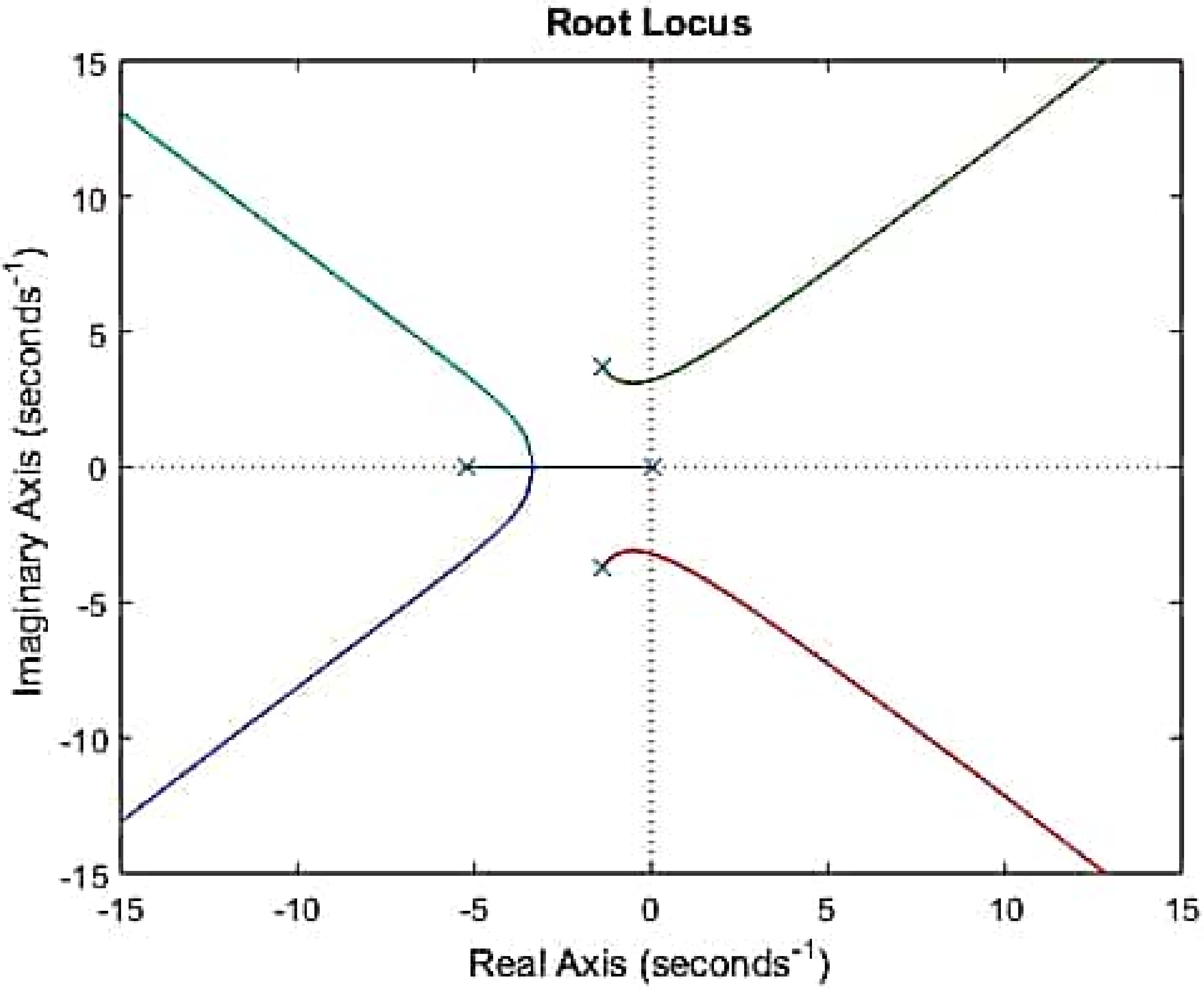

Step Response
1
0.5
0
Amplitude
0
2
4
6
Time (sec)


Step Response
1
0.5
0
Amplitude
0
0.5
1
Time (sec)


Step Response
1.5
1
0.5
0
Amplitude
0
0.5
1
Time (sec)

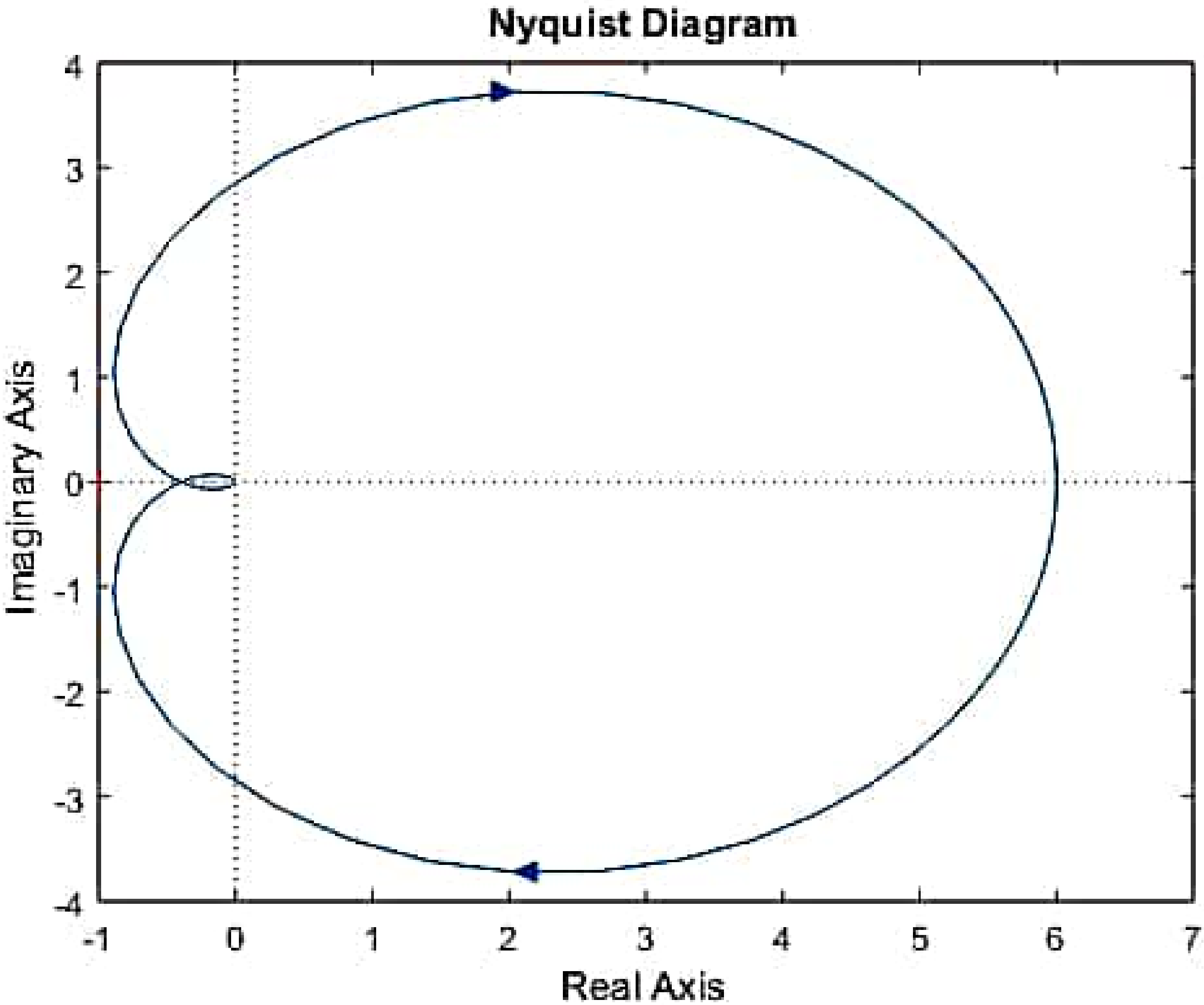

Step Response
1.5
1
0.5
0
Amplitude
0
0.5
1
Time (sec)

```
%Program for root locus:
% Given ; G(s)H(s)=10/(s^4+8*s^3+36*s^2+80*s)
%Program :
p = [0 0 0 0 10];
q = [1 8 30 82 0];
sys=tf(p,q);
zpk(sys)
rlocus(sys)
tf(sys)
```

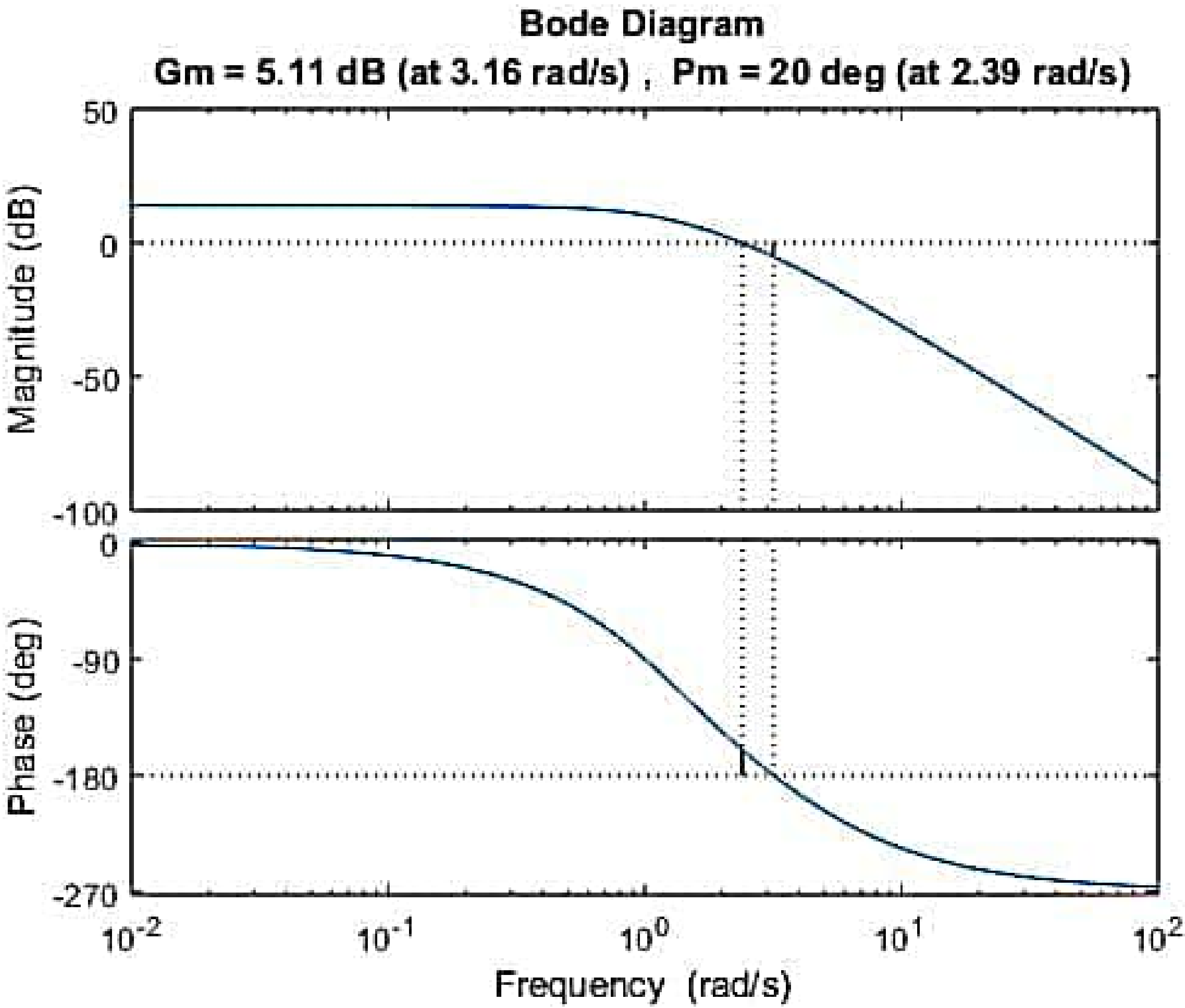


Root Locus
15
10
5
0
-5
-10
-15
Imaginary Axis (seconds^{-1})
-15
-10
-5
0
5
10
15
Real Axis (seconds^{-1})

```
%Program for Nyquist plot:
% Given the T.F: 60/(s+1)(s+2)(s+5)
%Programme:
p = [0 60];
q = [1 8 20 10];
sys = tf(p,q);
nyquist(sys)
```


Nyquist Diagram
Imaginary Axis
Real Axis
4
3
2
1
0
-1
-2
-3
-4
-1
0
1
2
3
4
5
6
7

```
%% BODE PLOT
%% Transfer function: 36/(s^3+6s^2+11s+6).
num = [0 35];
den = [1 6 10 6];
sys = tf(num,den);
bode(sys)
margin(sys)
```


Bode Diagram
Gm = 5.11 dB (at 3.16 rad/s) , Pm = 20 deg (at 2.39 rad/s)
Magnitude (dB)
50
0
-50
-100
Phase (deg)
0
-90
-180
-270
10^-2
10^-1
10^0
10^1
10^2
Frequency (rad/s)