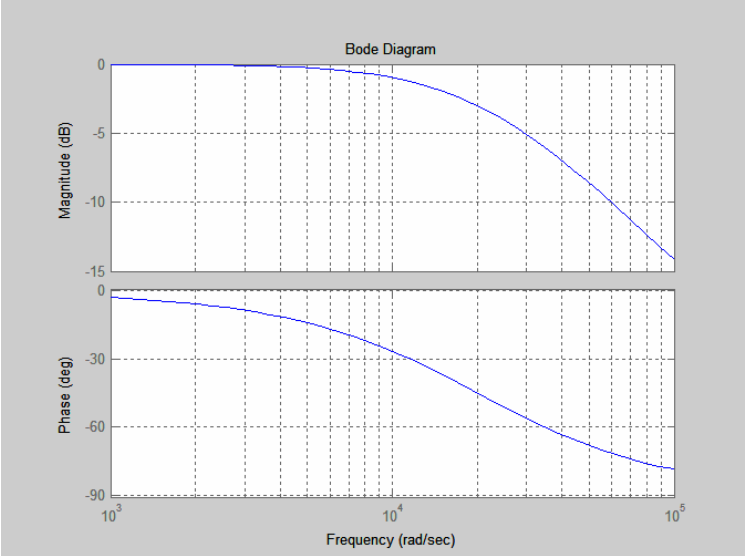
BODE PLOTS IN MATLAB

Examples using three different methods applied to the transfer function from Prelab 1:

$$TF = \frac{20000}{s + 20000}$$

Method 1: Easiest (If you have the Control Toolbox in Matlab)

```
s=tf('s');
H = (20000/(s+20000));
Bode(H)
grid on
```



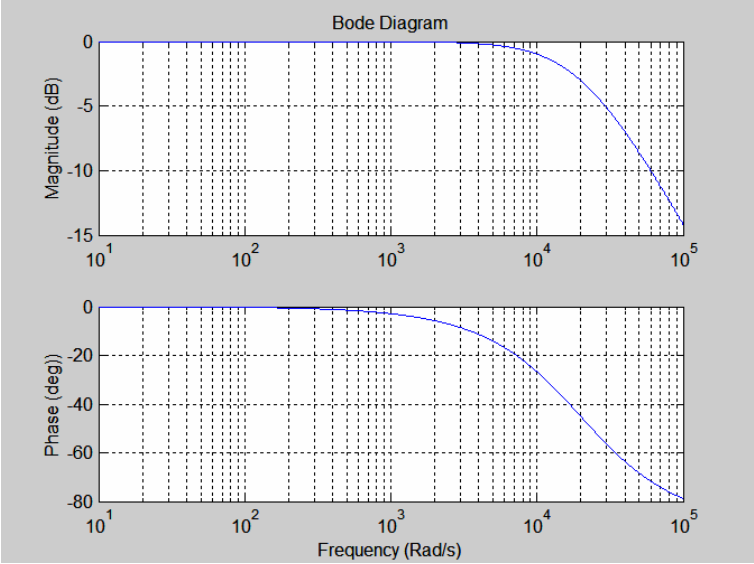
Method 2: Annalisa's Way (With no Control Toolbox…)

```
%Expand the numerator and denominator of your transfer function by multiplying out the terms.  Then
%make an array of the coefficients of the numerator and denominator of the transfer function in descending
%order of powers.  Example: if numerator is As^2+Bs+C, array will be num=[A B C].  Note that the arrays
%for the numerator and denominator must be equal in length.
numTF=[0 20000];
denomTF=[1 20000];
w=0:10:10e4;

%Function 'freqs' gives the frequency response in the s-domain
Y=freqs(numTF,denomTF,w);
y1=abs(Y);
y2=angle(Y);

subplot(2,1,1)
semilogx(w,20*log10(y1))
grid on
ylabel('Magnitude (dB)')
title('Bode Diagram')

subplot(2,1,2)
semilogx(w,y2*(180/pi))
grid on
ylabel('Phase (deg))')
xlabel('Frequency (Rad/s)')
```



Method 3: Dr. Rasmussen's Way (With no Control Toolbox….)

```
%Function 'logspace' creates an array of 200 points from -1 to 10^5 spaced logarithmically
w=logspace(-1,5,200);
MagH=sqrt(0^2+20000^2)./sqrt(w.^2+20000^2);

MagHdb=20*log10(MagH);
PhaseHRad=-atan(w/20000);
PhaseHDeg=PhaseHRad*180/pi;

subplot(2,1,1)
semilogx(w,MagHdb)
ylabel('20 log10(|TF|) [dB]')
title('Bode Diagram')
grid on

subplot(2,1,2)
semilogx(w,PhaseHDeg)
xlabel('frequency [rad/s]')
ylabel('Phase Angle [deg]')
grid on
```