<u>EE387 – LAB 04</u> FILTER DESIGN US<u>ING MATLAB</u>

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EXERCISE

1.

```
clear all;
close all;
Fp = 1000; Fs = 5000; Fsample = 10000;
Wp = Fp / Fsample;
Ns = Fs / Fsample;
[N, Wn] = buttord(Wp, Ws, 3, 30);
[zeros_, poles_, scale_] = butter(N, Wn);
[a, b] = butter(N, Wn);
tf = zpk(zeros_, poles_, scale_);
pode(tf);
figure;
freqz(a, b, 5000, Fsample);
Magnitude (dB)
    50
     0
    -50
   -100
  -150
   -200
       0
             1000
                     2000
                             3000
                                     4000
                                             5000
                    Frequency (Hz)
Phase (degrees)
     0
    -50
   -100
   -150
   -200
             1000
                     2000
                             3000
       0
                                     4000
                                             5000
                    Frequency (Hz)
```

2.

```
clear all;
close all;
N = 4;
Fp = 1000;
Wp = 2 * pi * Fp;
[num, den] = butter(N, Wp, 's');
fil = tf(num, den);
bode(fil);
                               Bode Diagram
Magnitude [dB]
     0
-20
-40
-60
-80
    -100
         10<sup>2</sup>
                             10<sup>3</sup>
                                                 10^{4}
                                                                     10<sup>5</sup>
Phase [deg]
    -100
                                                                fil
    -200
-300
         10<sup>2</sup>
                             10<sup>3</sup>
                                                 10^{4}
                                                                     10<sup>5</sup>
                              Frequency [rad/s]
```

3.

```
clear all;
close all;
N = 4;
Rp = 2;
fp = 1000;
Wp = 2 * pi * fp;
[num, den] = cheby1(N, Rp, Wp, 's');
fil = tf(num, den);
bode(fil);
```

Bode Diagram



