MECH 6323 - HW 1

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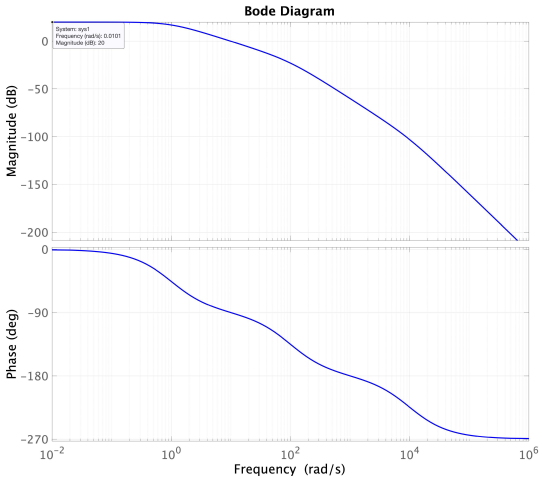
1 Problem 1

2 Problem 3

Problem: For each of the bode plots:

1. Determine the breakpoints and the transfer function.
2. Determine the gain cross-over frequency ω_c and the phase cross-over frequency ω_{180}.

2.1 Bode Plot 1:



Gain, Poles, and Zeros:

1. **Gain:** 20 db = 10
2. **Poles:**
   (a) $10^0 = 1$ rad/s
   (b) $10^2 = 100$ rad/s
   (c) $10^4 = 10,000$ rad/s
3. Zeros: (NA)

Transfer Function:

$$H(s) = \frac{10}{\left(1 + \frac{s}{1}\right)\left(1 + \frac{s}{100}\right)\left(1 + \frac{s}{10000}\right)}$$

Cross-over Frequency:

1. $\omega_c = 10^1 = 10$ rad/s
2. $\omega_{180} = 10^3 = 100$ rad/s

2.2 Bode Plot 2:

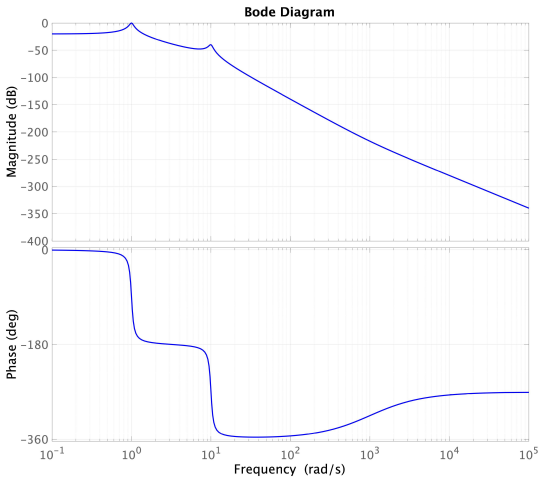


Figure 1: Bode Plot 2

Gain, Poles, and Zeros:

1. **Gain:** 20 db = 10
2. **Poles:**
   (a) $10^0 = 1$ rad/s
   (b) $10^2 = 100$ rad/s
   (c) $10^4 = 10,000$ rad/s
3. Zeros: (NA)

Transfer Function:

$$H(s) = \frac{10}{\left(1 + \frac{s}{1}\right)\left(1 + \frac{s}{100}\right)\left(1 + \frac{s}{10000}\right)}$$