Name: Key

EE322 Fall 2008 Quiz 8

1. Suppose a system has a frequency response given by:

$$H(j\omega) = 10{,}000\frac{j\omega+1}{(j\omega+10)(j\omega+1000)}$$

a. Write the frequency response in the *standard form* for a Bode plot.

$$\frac{10{,}000\left(j\frac{\omega}{1}+1\right)}{10\left(\frac{j\omega}{10}+1\right)1000\left(\frac{j\omega}{1000}+1\right)}$$

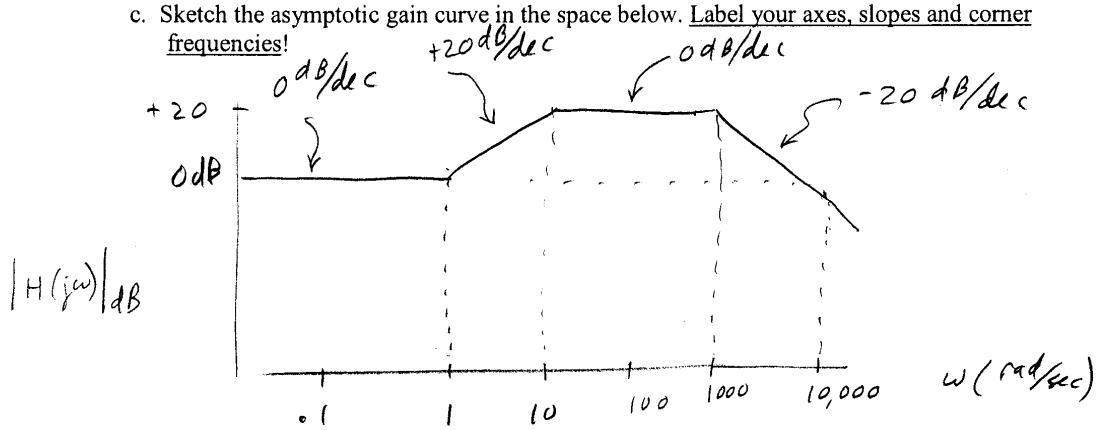
H(jω) = $\dfrac{\left(j\frac{\omega}{1}+1\right)}{\left(j\frac{\omega}{10}+1\right)\left(\frac{j\omega}{1000}+1\right)}$

b. What are the corner frequencies, *and* are they associated with poles or zeros?

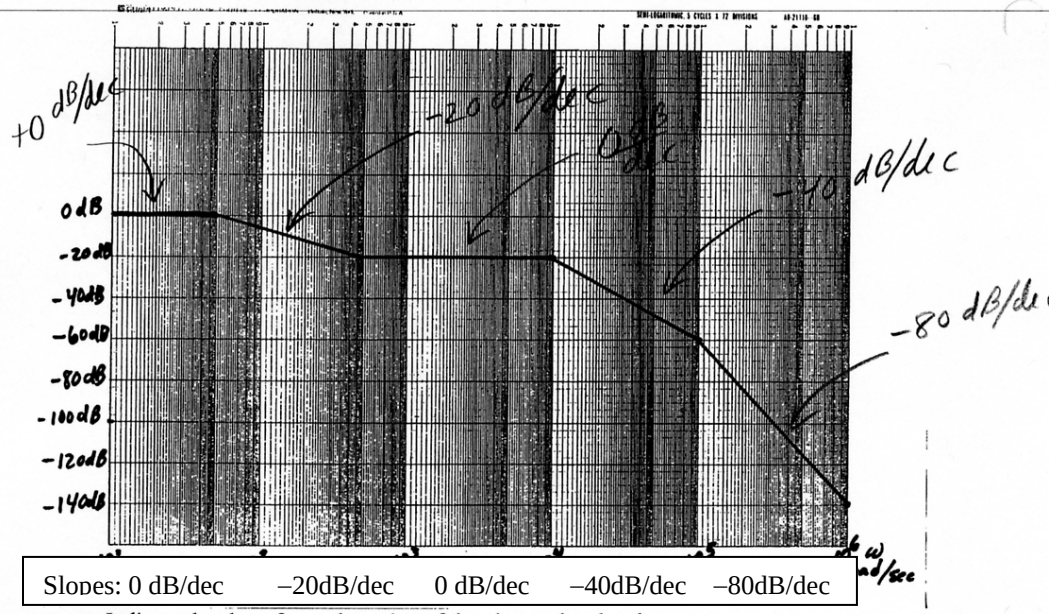
$\omega = 1$ zero

$\omega = 10, 1000$ pole

c. Sketch the asymptotic gain curve in the space below. Label your axes, slopes and corner frequencies!



2. Given the Bode magnitude plot below, answer the questions that follow. If the frequency axis is hard to read, it starts at ω=10 rad/sec and ends at $\omega=10^6$ rad/sec.



Slopes: 0 dB/dec –20dB/dec 0 dB/dec –40dB/dec –80dB/dec

a. Indicate the slope for each section of the plot on the plot above.

b. Identify the corner frequencies and state whether they correspond to zeros or poles. If they correspond to double zeros or double poles, state so.

ω	
50	- pole
500	- zero
10,000	- double pole
100,000	- double pole

c. What is the system gain (i.e., the constant factor in the frequency response)?

0 dB ⇒ Gain = 1

d. Write one possible equation for H(jω) that could result in a magnitude plot like this.

$$\frac{\frac{j\omega}{500}+1}{\left(\frac{j\omega}{50}+1\right)\left(\frac{j\omega}{10{,}000}+1\right)^2\left(\frac{j\omega}{100{,}000}+1\right)^2}$$

e. What type of frequency filter is this? $\boxed{\text{LPF}}$

Bonus: Who was the leader of the Soviet Union when the Berlin Wall came down?

Mikhail Gorbachev