Homework 8: Bode Plots

Introduction

The problems for this week focus on Bode plots.

Problems

Connect

(1) A&S 14.7.

(2) A&S 14.12.

(3) A&S 14.15.

(4) A&S 14.22.

(5) A&S 14.23.

(6) A&S 14.24.

Sakai

(1) Bode Plot Approximations: *Sketch* the straight-line approximations for the Bode magnitude and phase plots for the two transfer functions below. For the magnitude plots, indicate all slopes and corners but do not include the correction at the corners (i.e. the $\pm$3n dB deviation from the corner for an nth order corner). For the phase plots, show the transition lines starting at one-tenth the corner frequency and progressing to ten times the corner frequency.

$$\mathbb{H}_a(j\omega) = 200\frac{(j\omega)(j\omega+2)}{(j\omega+2000)(j\omega+200000)} = 0.000001\frac{(j\omega)(\frac{j\omega}{2}+1)}{\left(\frac{j\omega}{2000}+1\right)\left(\frac{j\omega}{200000}+1\right)}$$

$$\mathbb{H}_b(j\omega) = 500\frac{j\omega}{(j\omega+50)(j\omega+2000)} = 0.005\frac{j\omega}{\left(\frac{j\omega}{50}+1\right)\left(\frac{j\omega}{2000}+1\right)}$$

(2) Bode Plot Calculations: Use MATLAB to generate the Bode magnitude and phase plots for each of the two transfer functions above. Include PNG versions of the Bode plots and the .m versions of your code. To save a PNG version of the plot, simply add the command:

```
print -dpng FILE
```

where FILE is the base file name you want; MATLAB will automatically append the appropriate extension.