

Due on 10/21/04 (Thursday at 5PM in 497 Cory)

For instructions on sketching Bode plots, please refer to Sections 6.1 and 6.1.1 in your text.

- (1) Hand sketch the Bode plot for the following transfer functions:

$$G(s) = \frac{1000(s+10)}{(s+1)(s+50)(s+200)}$$

$$G(s) = \frac{s+1}{s(s+3)}$$

$$G(s) = \frac{1}{s(s^2 + 3s + 10)}$$

$$G(s) = \frac{1}{s-1}$$

$$G(s) = \frac{s+2}{s(s-1)} \quad (\text{hint: use the result from the above transfer function})$$

- (2) Textbook problem 6.20. (Note that the transfer function in the problem is same as the 2nd transfer function in problem (1). Can you sketch the Nyquist plot based on the Bode plot from problem (1)?)
- (3) Textbook problem 6.21 (sketch the Nyquist plot based on the Bode plot).
- (4) Sketch the Nyquist plot of the following transfer functions and find the range of k in which the closed loop system is stable. The transfer function $G(s)$ is the forward block in a unity feedback system.

$$G(s) = \frac{k}{(s^2 + 4)}$$

$$G(s) = \frac{k}{(s^2 - 4)}$$