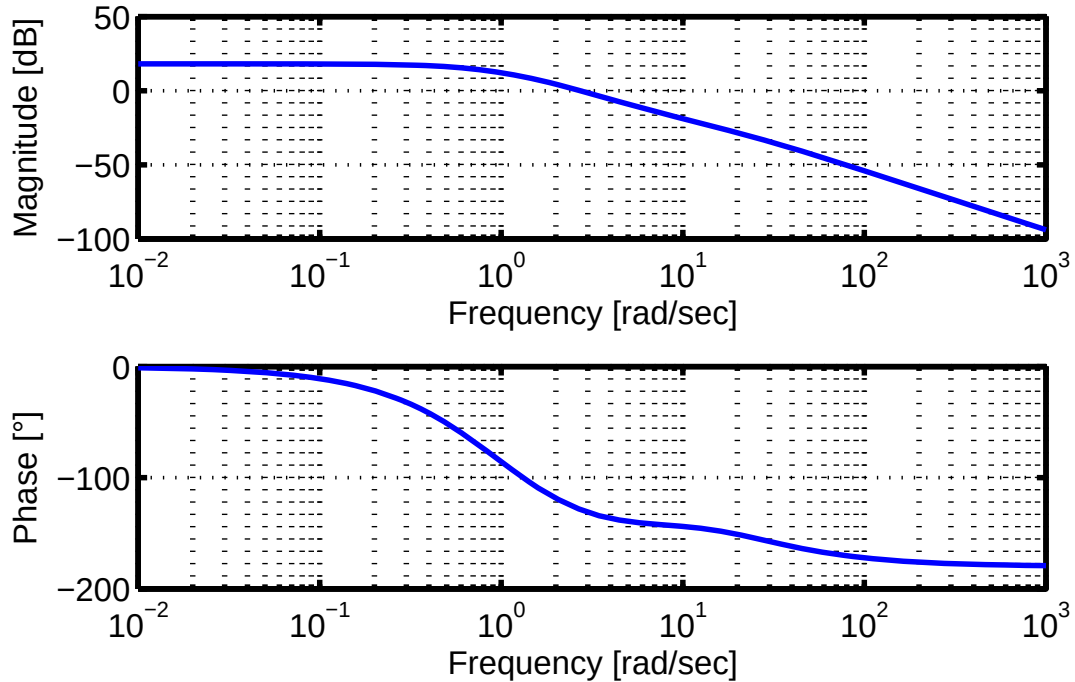


Homework 9: Bode Plot

Note: This homework assignment is due on Thursday 10.05.2012, 15:40.

Problem 21:

- a. We are given the following bode plot of a transfer function $G(s)$.



Assume that the input $u(t) = 5 \sin(2t) + 3 \sin(10t + \pi/2)$ is applied to the transfer block with transfer function $G(s)$. Determine the output signal $y(t)$.

- b. Sketch the straight-line approximation of the bode plot of the transfer function

$$G(s) = \frac{10s + 5}{2s^2 + 4s + 2}$$

Hint: Use the bode plot template on the second page.

- c. Recall that the magnitude (in dB) and phase (in radian) of a numerator factor $(1 + j\omega T)$ (minimum phase zero) are computed as $|1 + j\omega T|_{dB} = 20 \log(\sqrt{1 + \omega^2 T^2})$ and $\angle(1 + j\omega T) = \arctan(\omega T)$. What is the magnitude and phase of the factor $(1 - j\omega T)$ (non-minimum phase zero)?
- d. Sketch the straight-line approximation of the bode plot of the transfer function

$$G(s) = 500 \frac{1 - s}{(1 + s)(s^2 + 7s + 100)}$$

Hint: Use the bode plot template on the third page.

Bode Diagram

