

GEORGIA INSTITUTE OF TECHNOLOGY
School of Electrical and Computer Engineering

Course ECE 2040
Circuit Analysis

Assigned: April 7, 2000

Due: April 14, 2000

Problem Set #12

Reading: Read the following sections from the class notes:

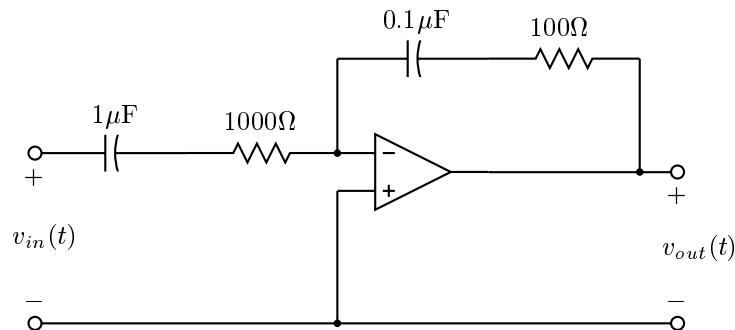
Chapter 9, Sections 9.3, 9.4

Reading: Read the following sections from Irwin and Wu:

Chapter 12, Sections 12.2, 12.3

Reminder: Quiz # 4 will be held on Wednesday, April 19, 2000 during the class hour. The class will be *closed book, closed notes*, but you are permitted to bring a calculator and one 8.5 inch \times 11.0 in sheet of handwritten notes. Coverage will include material up to the lecture on April 7.

Problem 12.1:



Plot the asymptotic Bode plot for the magnitude of the frequency response of the above circuit.

Problem 12.2: Sketch Bode magnitude and phase plots for the following system functions

(a) $H(s) = \frac{1}{s+10}$

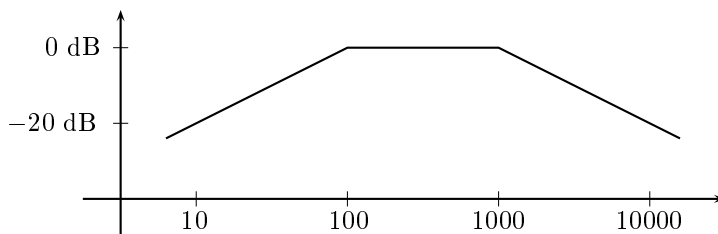
(b) $H(s) = 1 - 10s$

(c) $H(s) = \frac{s-20}{s+200}$

Problem 12.3: A circuit with the system function

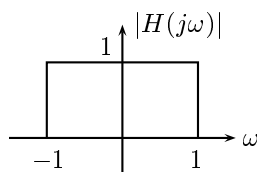
$$H(s) = \frac{ks}{(s+a)(s+b)}$$

has the Bode magnitude plot shown below.



Determine the values of k , a , and b .

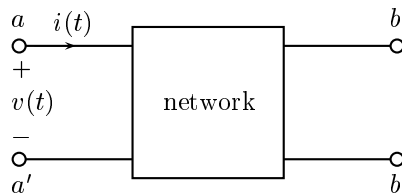
Problem 12.4:



A circuit with the system function $H(s)$ has the approximate frequency response shown above. This system is used as the basis for a new filter whose system function, $G(s)$, is given by

$$G(s) = H\left(\frac{5}{s}\right).$$

Sketch the frequency response $G(j\omega)$.



For the two-terminal pair circuit shown above the relation between $v(t)$ and $i(t)$ is

$$v(t) = 3i(t) + 2\frac{di(t)}{dt}$$

when the terminals b and b' are open-circuited and

$$v(t) = i(t)$$

when the terminals b and b' are short-circuited. Determine a possible circuit having these properties.