EECS 70A: Network Analysis Homework #5

- The homework is due Friday 6/05/2015 at 5:30pm

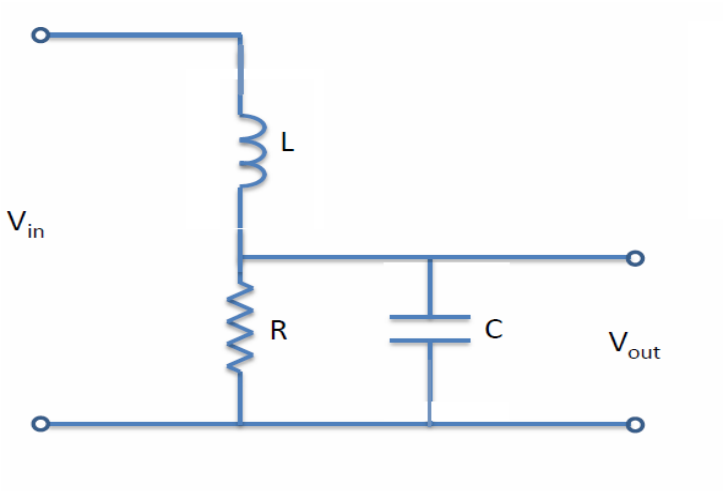
  You can choose either way to turn in your homework.

  – 1) Turn it in during discussions

  – 2) Turn it in during TA office hour

  - 3) EEE Dropbox

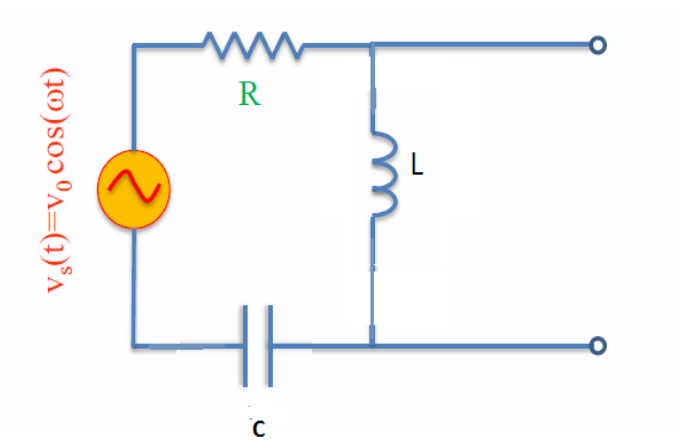
Problem 1: Find the transfer function of the circuit



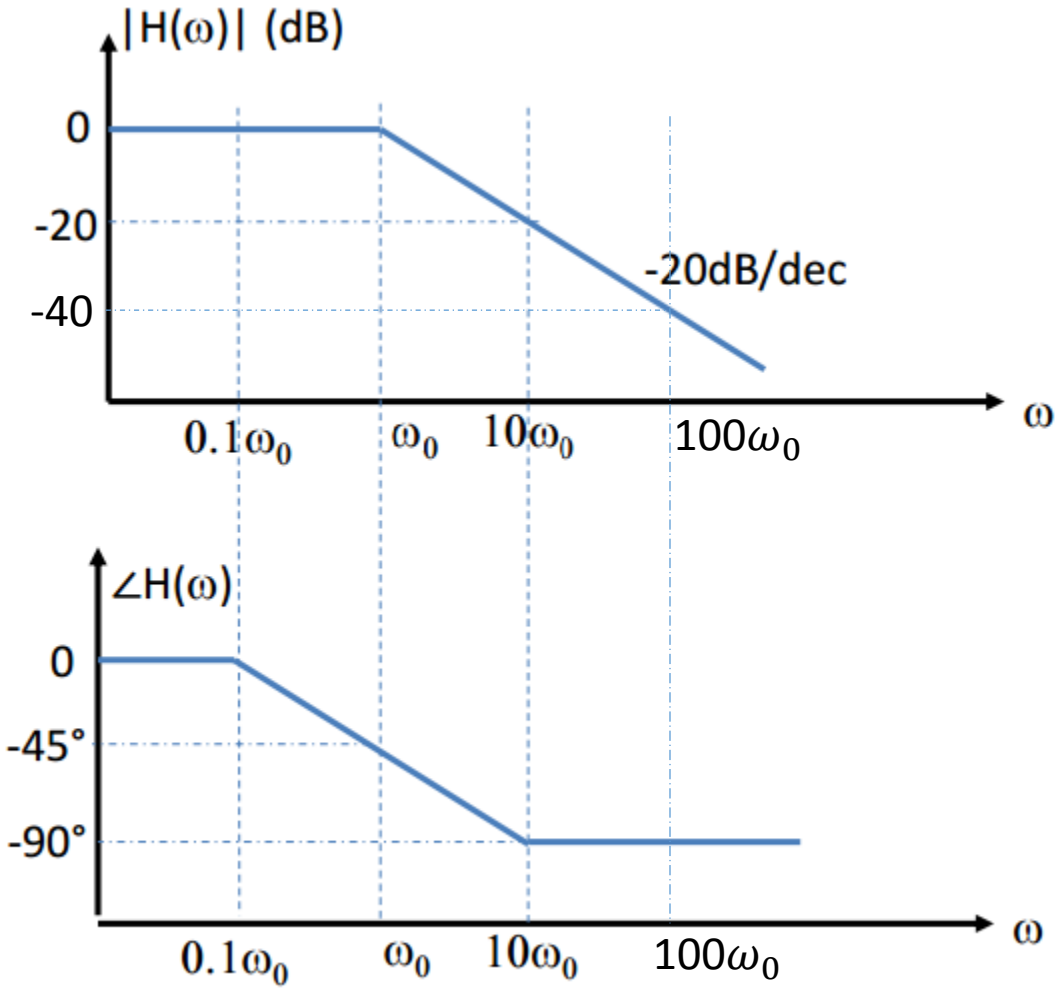
Problem 2: Given $H_\omega = \frac{1}{1+j\omega\tau_1} * \frac{1}{1+j\omega\tau_2}$, where $\tau_2 > \tau_1$,please draw the Bode plot (only magnitude) of the transfer function.

Extra credit: Try to design a circuit having such a transfer function

Problem 4: Find $\mathbf{V_{th}}$ and $\mathbf{Z_{th}}$, and draw the Thevenin equivalent circuit for the following circuit.



Problem 5: Given the transfer function *H(ω)* of a system, if the input is $V_{in} = Re(\sum_n a_n e^{j\omega_n t})$
then the output can be expressed as $V_{out}(t) = Re[\sum_n a_n H(\omega_n) e^{j\omega_n t}]$
where H(ω) = | H(ω) | $e^{j\Phi(w)}$.
Now, for a system, the Bode plot of its transfer function is illustrated in the next page, and $\omega_o \tau$ = 1.
If the input voltage is $V_{in}(t) =$ Re (1 . $e^{j\omega_1 t} + 1 . e^{j\omega_2 t}$)
Find the output voltage for the following cases:
a) $\omega_1 = 0.01\tau^{-1}$ $\omega_2 = 10\tau^{-1}$
b) $\omega_1 = 0.1\tau^{-1}$ $\omega_2 = 100\tau^{-1}$


|H(ω)| (dB)
0
-20
-40
-20dB/dec
ω
0.1ω0
ω0
10ω0
100ω0
∠H(ω)
0
-45°
-90°
ω
0.1ω0
ω0
10ω0
100ω0