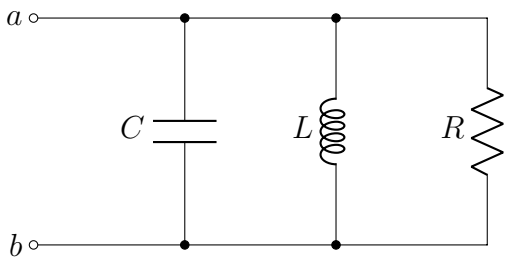
NAME:

Homework 3
-
Sinusoidal analysis

Deadline: Wednesday, 11 May 2022, 11:55 PM

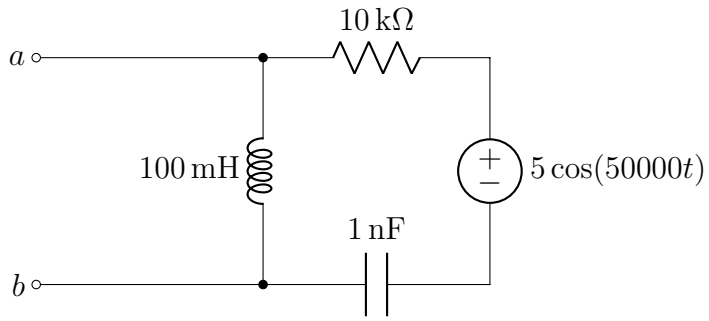
You can send your solutions in electronic version to NYU Brightspace/Assignment. **No extended deadline!**

Exercise 1 - Equivalent impedance/admittance



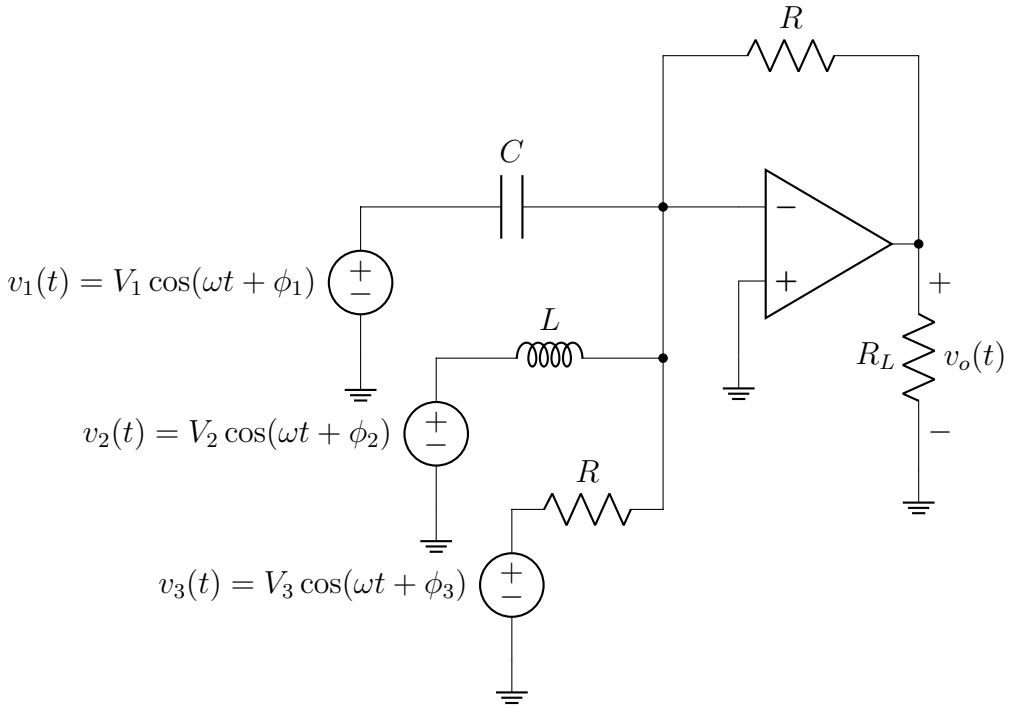
- Determine the equivalent impedance of this network, as a function of the angular frequency ω.
- Which element is it equivalent to when $\omega \to 0$?
- Which element is it equivalent to when $\omega \to \infty$?
- Which element is it equivalent to when $\omega = \dfrac{1}{\sqrt{LC}}$?

Exercise 2 - Thévenin equivalence



- Determine the equivalent Thévenin circuit in the phasor domain.

Exercise 3 - Op Amp



The operational amplifier is supposed to be ideal.
Questions:

1. Determine the phasor $\mathbf{V}_o$ of $v_o(t)$ as a function of R, L, C, ω, $\mathbf{V}_1$ ($V_1\underline{/\phi_1}$), $\mathbf{V}_2$ ($V_2\underline{/\phi_2}$) and $\mathbf{V}_3$ ($V_3\underline{/\phi_3}$)
2. Supposing that $v_1(t) = v_2(t)$, which angular frequency leads to $v_o(t) = -v_3(t)$?
3. Supposing that $v_2(t) = 0$ and $v_1(t) = v_3(t)$, which frequency leads to
   $v_o(t) = \dfrac{\sqrt{2}}{2}V_1\cos(\omega t + \phi_1 + 225°)$