Homework 7

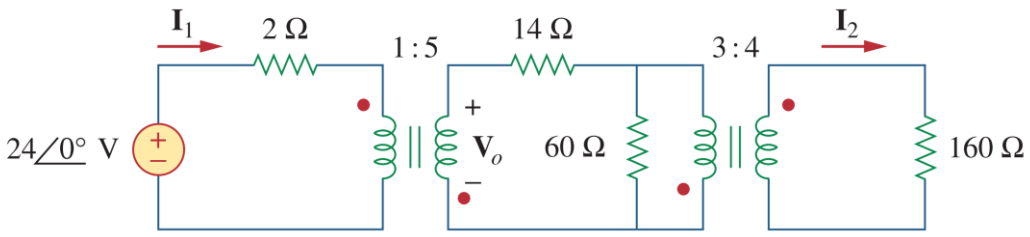
Due date: 18:30 of Dec.16th, 2021

Turn in your homework in Class or to Tutorial Course Classroom 1B-110

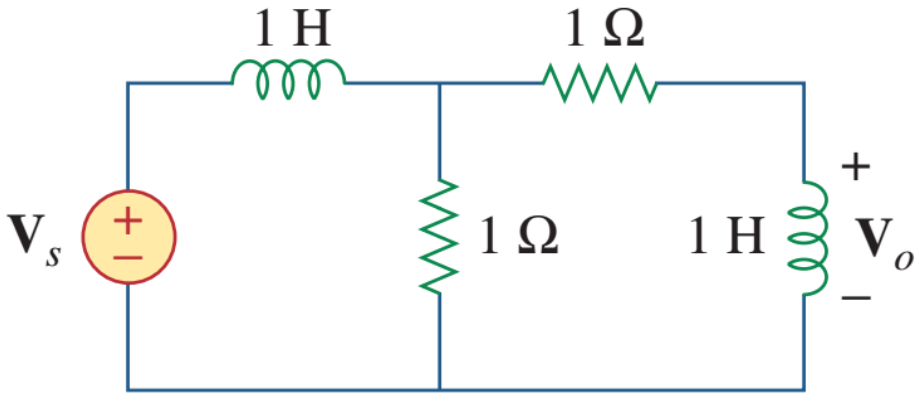
Rules:

- Work on your own. Discussion is permissible, but extremely similar submissions will be judged as plagiarism.
- Please show all intermediate steps: a correct solution without an explanation will get zero credit.
- Please submit on time. No late submission will be accepted.
- Please prepare your submission in English only. No Chinese submission will be accepted.
- If needed, round the number to the nearest hundredths, i.e., rounding it to 2 decimal places.

1. For the following ideal transformer circuit, calculate **I_1, I_2, and V_o**.

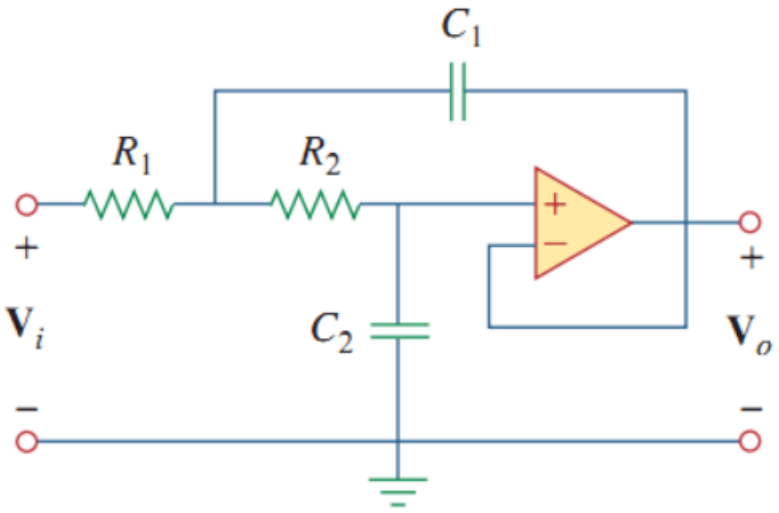


2. Derive the transfer function Y(ω), the voltage gain between $\mathbf{V_o}$ and the voltage source $\mathbf{V_s}$. Draw the corresponding bode plot.



3. Consider the following circuit with an operational amplifier working in the linear region. The input/output voltage are $\mathbf{V_i}$, $\mathbf{V_o}$ **, respectively**. The circuit is operating at the angular frequency **ω** rad/s.

1) Find the transfer function of the circuit $\mathbf{Y(\omega) = V_o / V_i}$.
2) Sketch the magnitude-frequency relation of bode plot wof **Y(ω).**
3) Determine what kind of filter it is from the bode plot.



4. Determine a possible **transfer function** for the following magnitude graph; Draw the **phase-frequency plot** according to the transfer function that you obtained.