ECE 209 — Final Exam

Estimated time for completion: <2 hours
17 December 2019

Rules of the Exam

Rule 1: The examination begins at 9:30am on Tuesday, 17 December 2019, and ends at 11:30pm on Tuesday, 17 December 2019.

Rule 2: There are three problems. Each problem has equal weight.

Rule 3: The exam is closed book and closed notes. You may use an 8.5" x 11" sheet of paper with notes, and a calculator.

Rule 4: Do not leave the room until you have completed the exam.

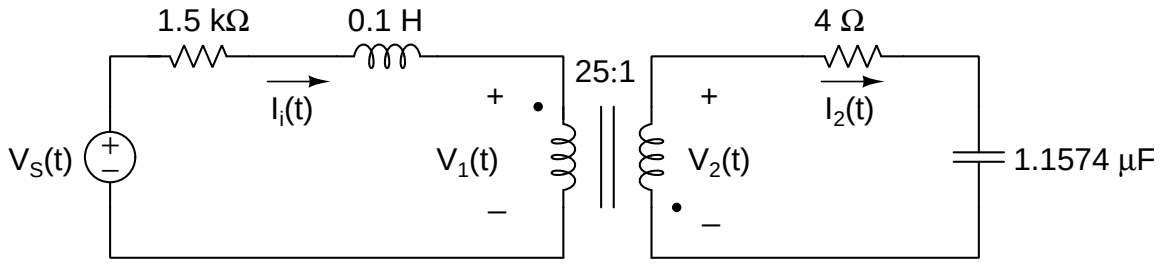
Rule 5: To receive full credit for an answer include the units along with the numerical answer.

Rule 6: Show all work - answers without supporting work will not receive credit.

_____

Name

Problem 1: In the circuit below, the transformer is ideal, and $V_s(t) = 25\cos(60,000t)$ V.



What is $V_1(t)$? _____

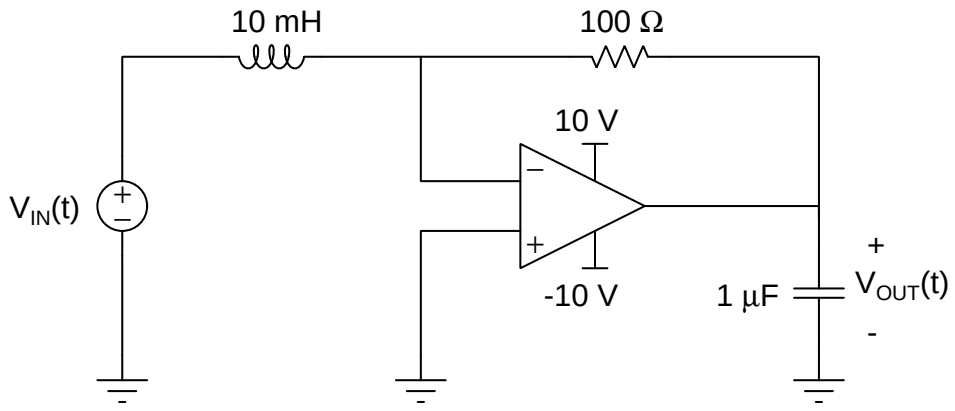
What is $V_2(t)$? _____

What is $I_1(t)$? _____

What is $I_2(t)$? _____

What is the frequency of $V_2(t)$ in Hertz? _____

Problem 2: In the circuit below, the Op Amp is ideal, and $\mathrm{V}_{IN}(t) = 0.5\cos(500t + 45°)$ V.



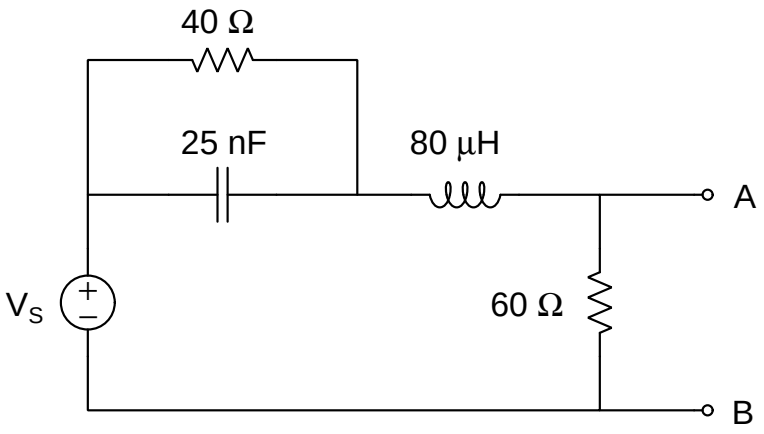
What is $\mathrm{V}_{OUT}(t)$? _____

What is the real power supplied by the voltage source? _____

What is the reactive power supplied by the source? _____

What is the apparent power supplied by the source? _____

Problem 3: In the circuit below, $\mathrm{V}_s(t) = 40\cos(10^6 t)$ V.



Draw the Thévenin equivalent circuit with respect to terminals A and B. Express the Thévenin equivalent voltage and impedance in the time domain.

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