ECE 214 — Exam # 2

Estimated time for completion: ≤ 1.25 hour
8 April 2014

Rules of the Exam

Rule 1: The examination period begins at 8:00am on Tuesday 8 April 2014 and ends at 9:15am on Tuesday 8 April 2014.

Rule 2: There are three problems. Each problem is worth five points. There is also an optional extra credit problem worth an additional five points.

Rule 3: For all answers, make sure to include the units along with the numerical answer and show all work.

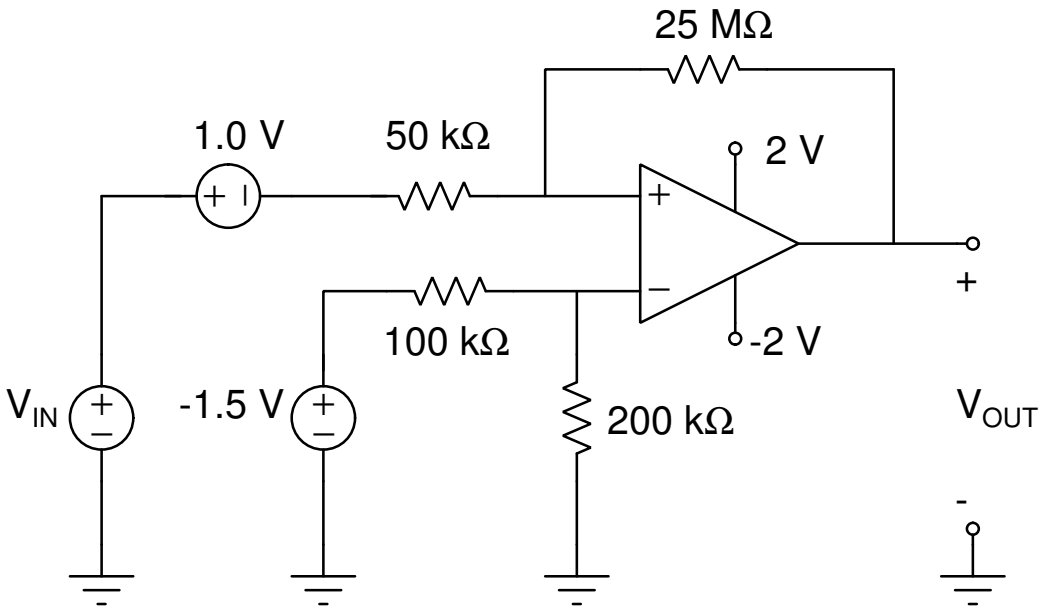
Rule 4: There is minimal partial credit.

Rule 5: The exam is closed book and closed notes but you may use your ECE 214 Laboratory Notebook and a calculator.

_____

Name

Problem 1 Consider the OpAmp circuit shown below. Assume the OpAmp is ideal.



(a) Is this circuit an inverting amplifier, a non-inverting amplifier, an inverting differentiator, an inverting integrator, or a Schmitt trigger? _____

(b) When $V_{IN} = 0$V, what is V_{OUT}? _____

(c) When $V_{IN} = -1.0$mV, what is V_{OUT}? _____

(d) When $V_{IN} = 10$mV, what is V_{OUT}? _____

(e) When $V_{IN} = -10$mV, what is V_{OUT}? _____

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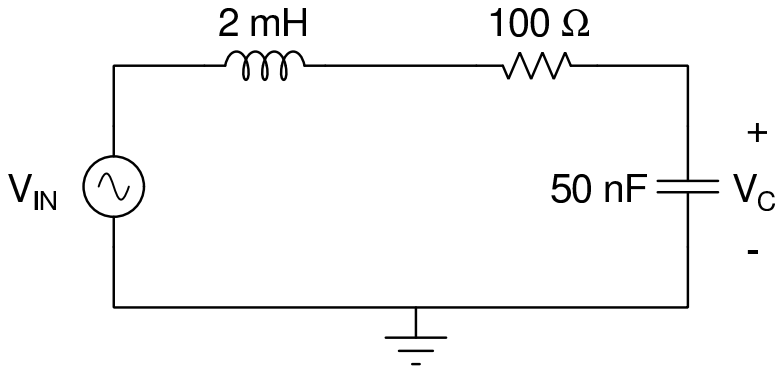
Problem 2 Consider the RLC circuit below. Assume all circuit elements are ideal.



(a) Is the circuit under damped, critically damped, or over damped? _____

(b) $V_{IN}(t) = 3\cos(4\pi \times 10^4 \cdot t + 30°)$
What are the magnitude and phase of $V_C(t)$? _____

(c) $V_{IN}(t)$ is a 5 V step function applied at $t = 0$. Assume no energy is stored in the circuit at $t = 0$. What is $V_C(33\mu s)$?

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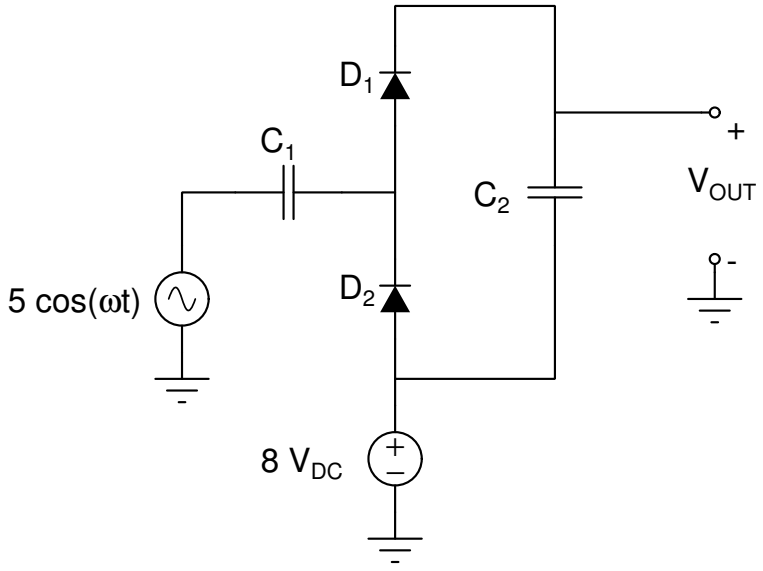
Problem 3 Consider the DC–DC voltage converter shown below. Assume all circuit components are ideal. Use the results from the Post–Lab of Lab #6 when answering the questions below.

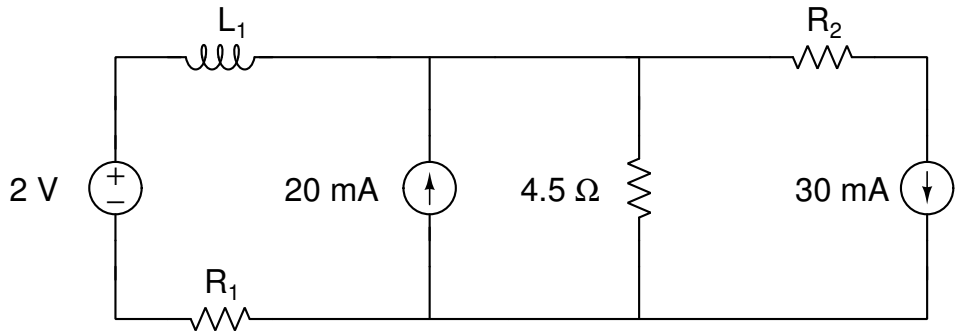


(a) Describe how this circuit works.

(b) What is $V_{OUT}(\infty)$? _____

Extra Credit Problem

In the circuit below, the 20 mA source delivers no power and absorbs no power. The circuit dissipates a total of 110 mW of power and stores 20 nJ of energy. Determine the values of R_1, R_2, and L_1.



$R_1 =$ _____ $R_2 =$ _____ $L_1 =$ _____

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