ECE 209 — Exam # 3

Estimated time for completion: <1.25 hour
26 November 2019

Rules of the Exam

Rule 1: The examination begins at 9:30am on Tuesday, 26 November 2019, and ends at 10:45pm on Tuesday, 26 November 2019.

Rule 2: There are three problems plus one extra credit problem.

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

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

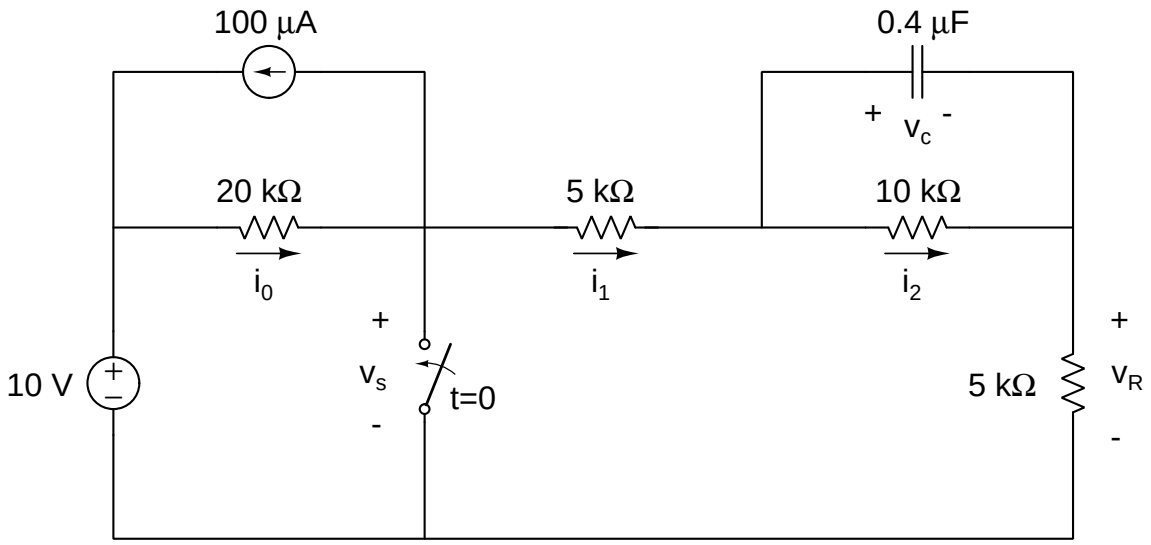
Rule 5: To receive full credit for an answer include the units along with the numerical answer.

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

_____

Name

Problem 1 (30 points). In the circuit below, the switch has been open for a very long time, and closes at $t = 0$.



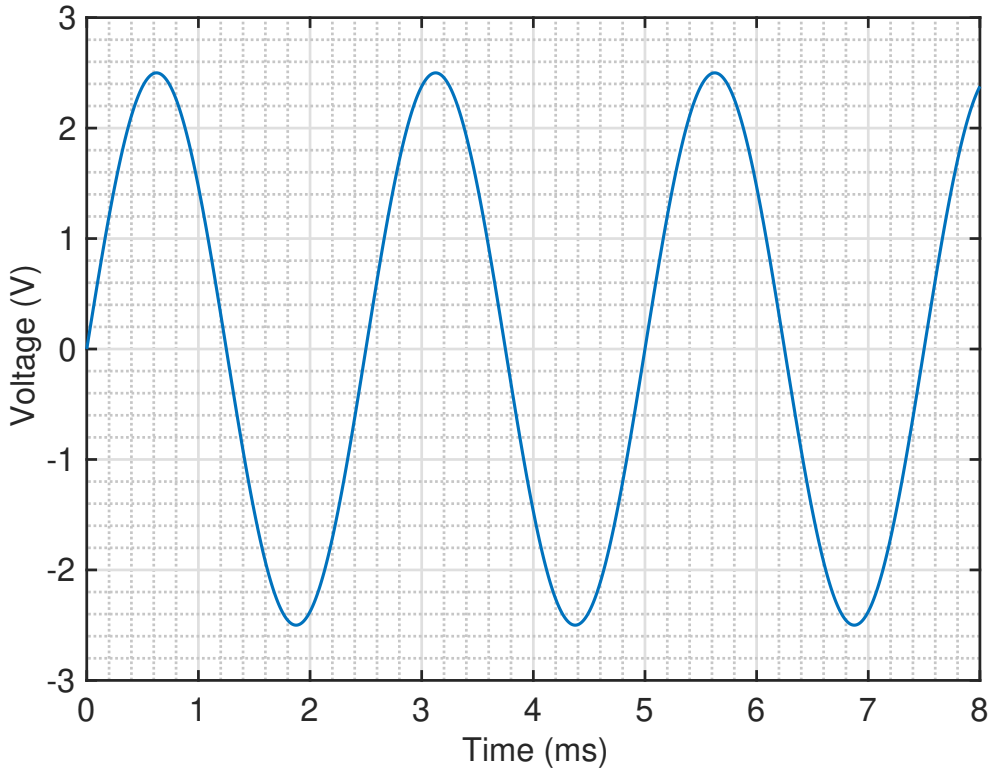
Complete the table below:

	$\mathbf{t = 0^-}$	$\mathbf{t = 0^+}$	$\mathbf{t = \infty}$
i_0			
i_1			
i_2			
v_s			
v_c			
v_R			

What is the time constant of the circuit for $t > 0$? _____

Problem 2 (35 points). The voltage waveform shown below can be described by the equation:

$$V(t) = V_m \cos(\omega t + \phi)$$



What is V_m? _____

What is ω? _____

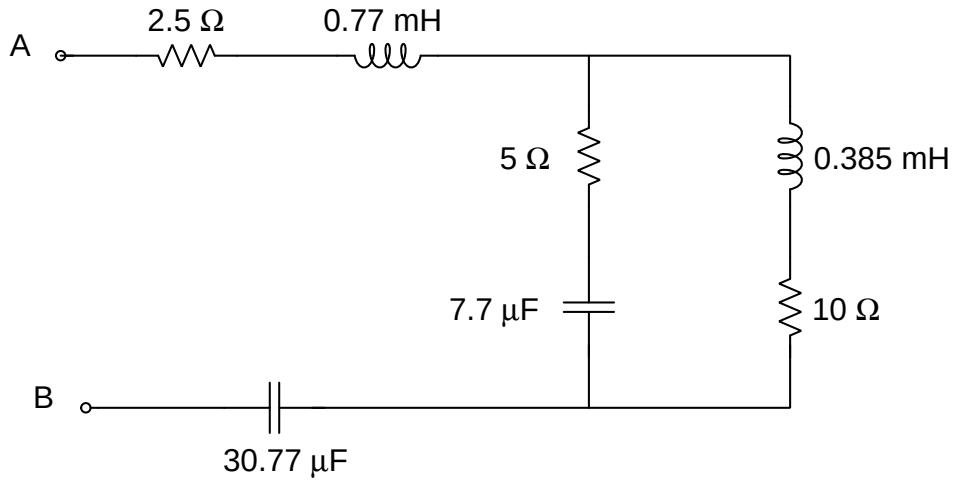
What is ϕ? _____

What is the peak-to-peak voltage? _____

What is V_{RMS}? _____

What is $\mathbf{V}$, the Phasor representation of $v(t)$? _____

Problem 3 (35 points). Consider the circuit below operating at a frequency of 2,069 Hz.



Draw the frequency domain representation of this circuit.

Calculate the equivalent impedance between terminals **A** and **B** _____

Calculate the equivalent admittance between terminals **A** and **B** _____

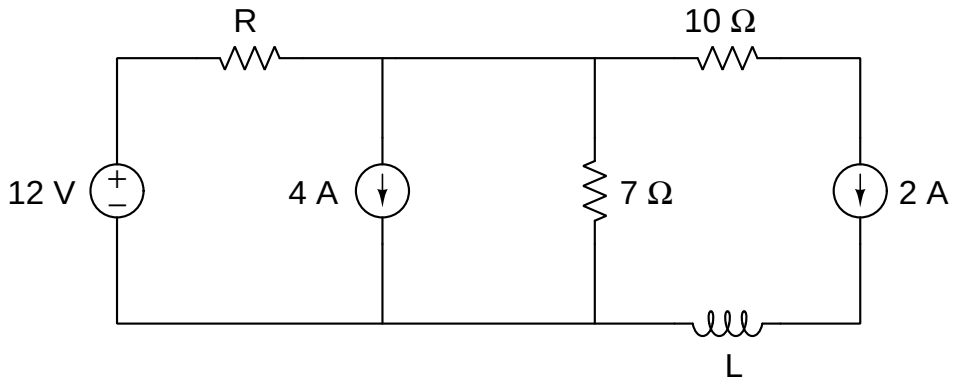
What is the equivalent resistance between terminals **A** and **B**? _____

What is the equivalent reactance between terminals **A** and **B**? _____

What is the equivalent conductance between terminals **A** and **B**? _____

What is the equivalent susceptance between terminals **A** and **B**? _____

Bonus Problem (6 points). In the circuit below, the 4A source delivers no power and absorbs no power. There is 10 mJ of energy stored in the inductor. Determine the values of R and L.



R = _____

L = _____

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