

ECE 209 — Exam # 3

Estimated time for completion: <75 minutes
22 November 2016

Rules of the Exam

Rule 1: The examination period begins at 11:00pm on Tuesday 24 November 2015 and ends at 12:15pm on Tuesday 24 November 2015.

Rule 2: There are three problems.

Rule 3: Show all work and state all assumptions. Make sure to include the units along with a numerical answer. Answers without support when needed will not receive credit.

Rule 4: The exam is closed book and closed notes. You may have an 8.5" x 11" sheet of paper with notes. You may use a calculator.

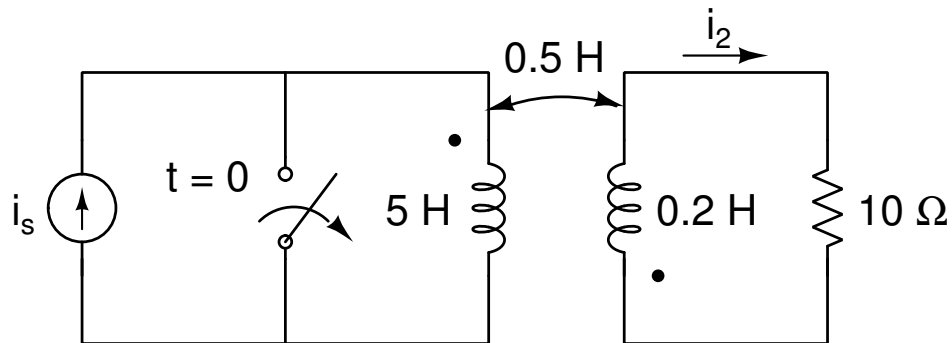
Name



Happy Thanksgiving!

Problem 1 (20 points)

In the circuit below, the switch has been closed for a very long time and opens at $t = 0$. There is no energy stored in the circuit at the time the switch opens.



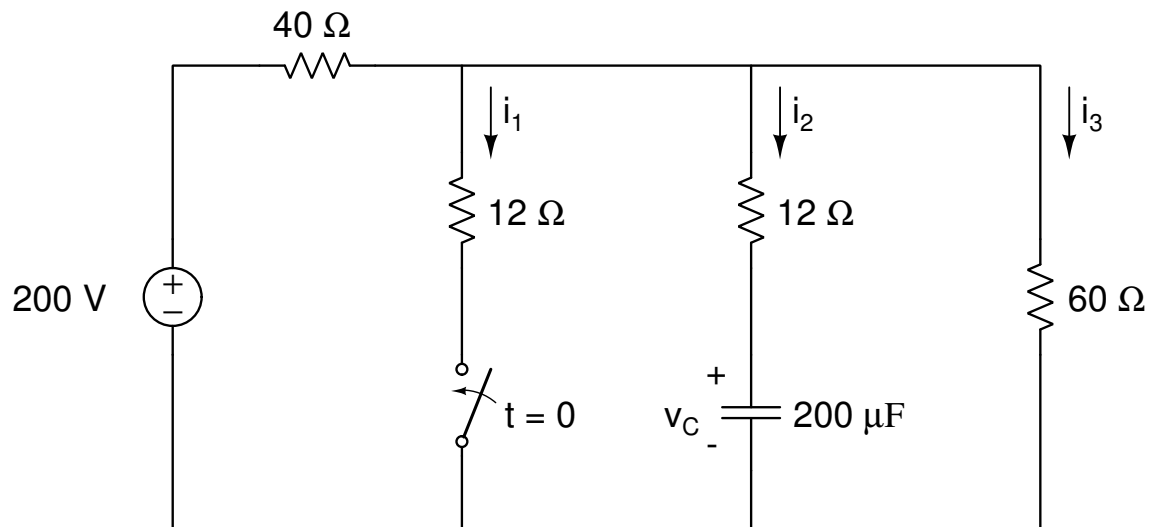
What is $i_2(0^-)$ _____

What is $i_2(0^+)$ _____

What is the differential equation that describes the behavior of $i_2(t)$ for $t \geq 0$? (Note: you do not need to solve the equation.)

Problem 2 (40 points)

In the circuit below, the switch has been open for a very long time and closes at $t = 0$.



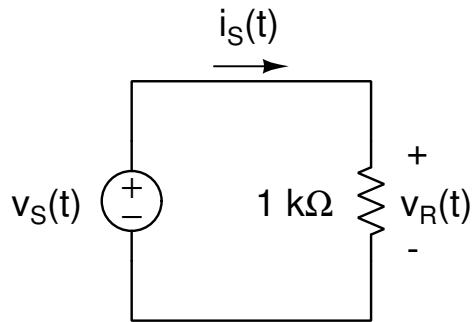
What is the time constant of the circuit for $t > 0$? _____

Complete the table below:

	$t = 0^-$	$t = 0^+$	$t = 5 \text{ ms}$	$t = \infty$
i_1				
i_2				
i_3				
v_C				

Problem 3 (40 points)

Part A. For the circuit below the voltage source $v_s(t) = 100 \cos(1885t - 55^\circ)$ V



What is the peak voltage across the resistor? _____

What is $v_s(4\text{ms})$? _____

What is $i_s(4\text{ms})$? _____

What is the frequency of $V_R(t)$ in Hz? _____

What is the average power dissipated by the resistor? _____

Part B. What is the Phasor representation of the following time-domain signals?

$v(t) = 20 \cos(360t - 30^\circ)$ mV _____

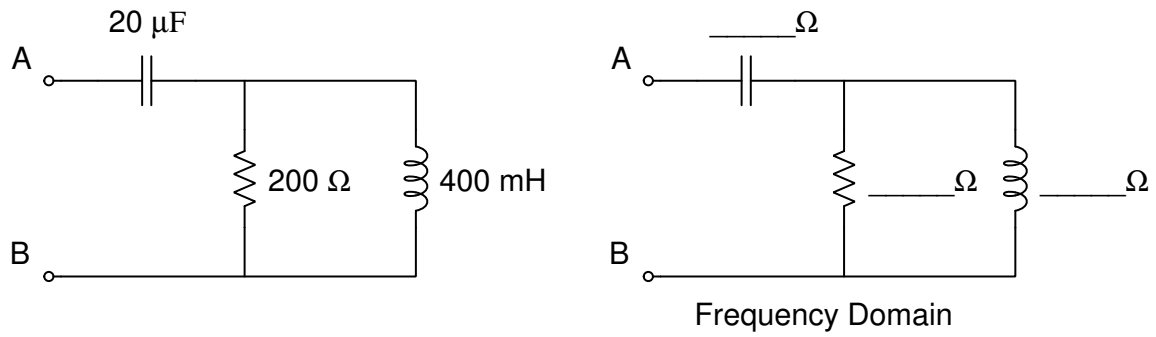
$i(t) = 45 \sin(450t + 70^\circ)$ A _____

Part C. What is the time-domain representation of the following Phasor signals when the frequency is 5 MHz?

$\mathbf{V} = 21 \angle -50^\circ$ V _____

$\mathbf{I} = 3 \angle 10^\circ$ A _____

Part D. Convert the circuit below on the left to the frequency domain when the frequency is 1.5 kHz.



At what radian frequency, ω , is the impedance Z_{AB} purely resistive? _____

Name: _____

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