

Course: ECE 53a
Quiz #3
Instructor: Pamela Cosman
Date: 3/2/09

First Name: _____

Last Name: _____

There are 3 problems.
The first two are worth 13 points each.
The last one is worth 14 points.

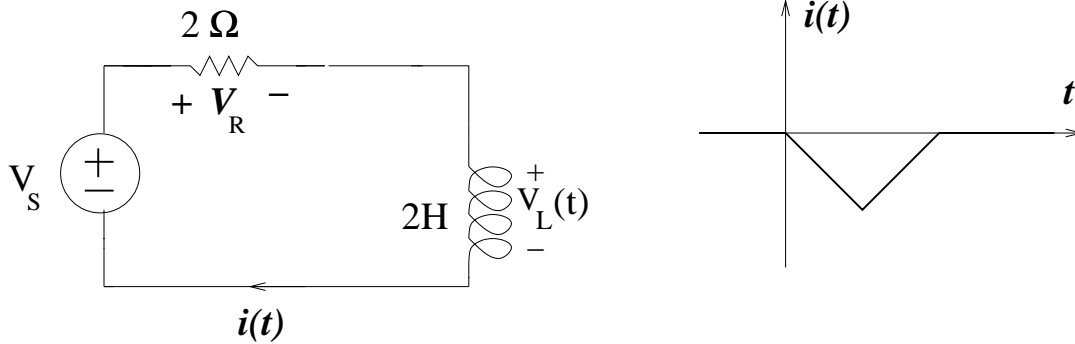
Problem	Possible	Score
1	13	
2	13	
3	14	
Total	40	

On this quiz you may use one page of notes (8.5 by 11 inches, both sides of the page).
No other notes or books allowed. No calculators.
You need to show your work for all problems.

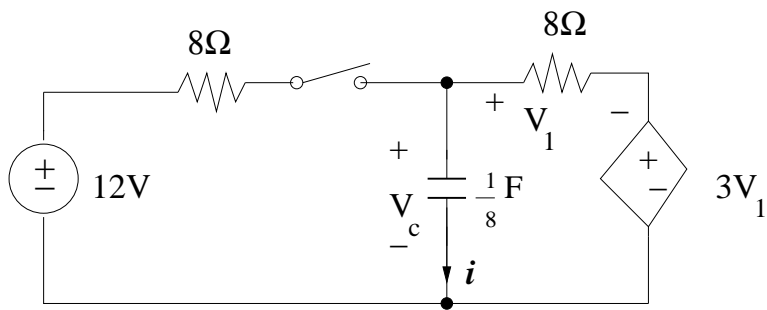
Problem 1: For this circuit, suppose that the current is given by the following function:

$$i(t) = \begin{cases} 0A & \text{for } t \leq 0 \text{ and for } t > 2 \\ -t & \text{for } 0 < t \leq 1 \\ t - 2 & \text{for } 1 < t \leq 2 \end{cases}$$

which is depicted below on the right. Determine expressions for, and sketch, the voltage across each of the 3 circuit elements: $v_s(t)$, $v_R(t)$, $v_L(t)$. Also find (and sketch) the instantaneous power dissipated by the resistor $p_R(t)$ and the energy absorbed by the inductor $w_L(t)$. Be precise about the ranges (e.g., $<$ or \leq or $>$ or \geq) for all these quantities.



Problem 2: For the circuit shown below, suppose that the switch has been closed for a long time, and it opens at time $t=0$. Write a differential equation for $V_c(t)$, the voltage across the capacitor. Find $V_c(t)$ and $i(t)$ for all time.



Problem 3: Use any method to find $i_L(t)$ (the current through the inductor) and $V_L(t)$ (the voltage across the inductor). Plot them, including the time interval just prior to switch movement.

