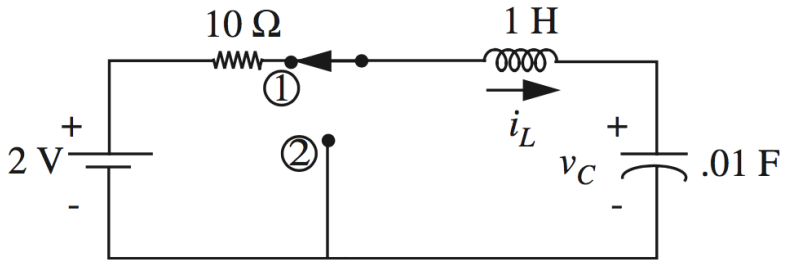
EE2210 Electric Circuits Spring 2017

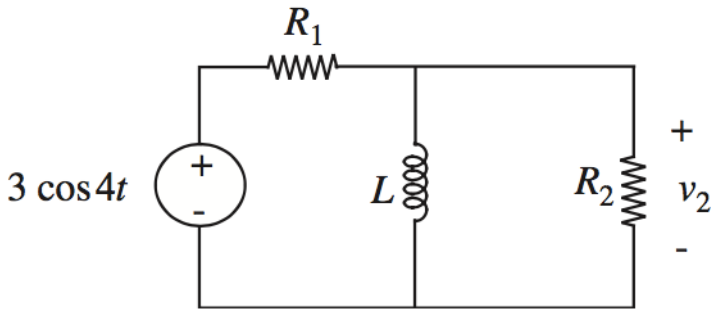
Quiz 3 (Total 100 points)

It is a closed-book, closed-note quiz. Calculator is allowed. Please show the process of thinking/calculation. Indicate your final answers clearly. Unit is needed if applicable.

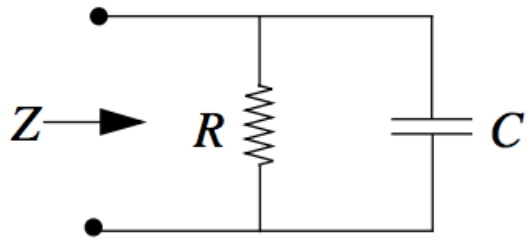
1. Second-order circuit: consider the circuit in the following figure. The switch has been in position 1 for $t < 0$. At $t = 0$, the switch is moved to position 2 and remains at position 2 for all $t > 0$. Find and sketch $v_C(t)$ and $i_L(t)$ for $t > 0$. Note R = 10 Ohms, L = 1 H, and C = 0.01 F. (20%)



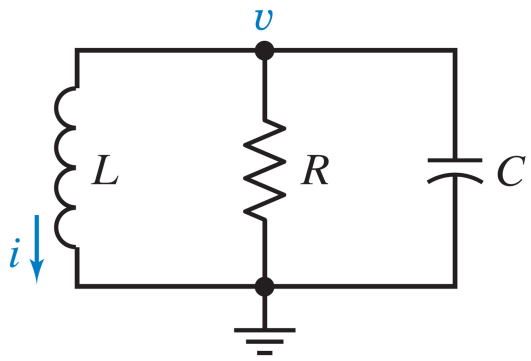
2. Find $v_2(t)$ in the sinusoidal steady state for the circuit in the following figure. Assume L = 10 H, R_1 = 120 Ohms, and R_2 = 60 Ohms. (20%)



3. Determine the impedance Z of the following circuit. Sketch its magnitude and phase as a function of frequency. (20%)



4. Consider the circuit in the following figure. R = 25/3 Ohms, L = 0.1 H, and C = 1 mF. Assume the initial conditions v(t = 0) = 10 V, i(t = 0) = -0.6 A. Find the expression of the zero-input response v(t) for t > 0. Sketch v(t) for t > 0. Indicate the period of v(t), and how many cycles it takes to settle, if v(t) is periodic. (20%)



5. A 80 kHz sinusoidal voltage source has zero phase angle and an amplitude of 25 mV. When this source is applied across the terminals of a capacitor, the resulting steady-state current has an amplitude of 628.32 μA. (a) What is the frequency of the current? (b) What is the phase angle of the current? (c) What is the capacitance of the capacitor? (d) What is the impedance of the current? (20%)