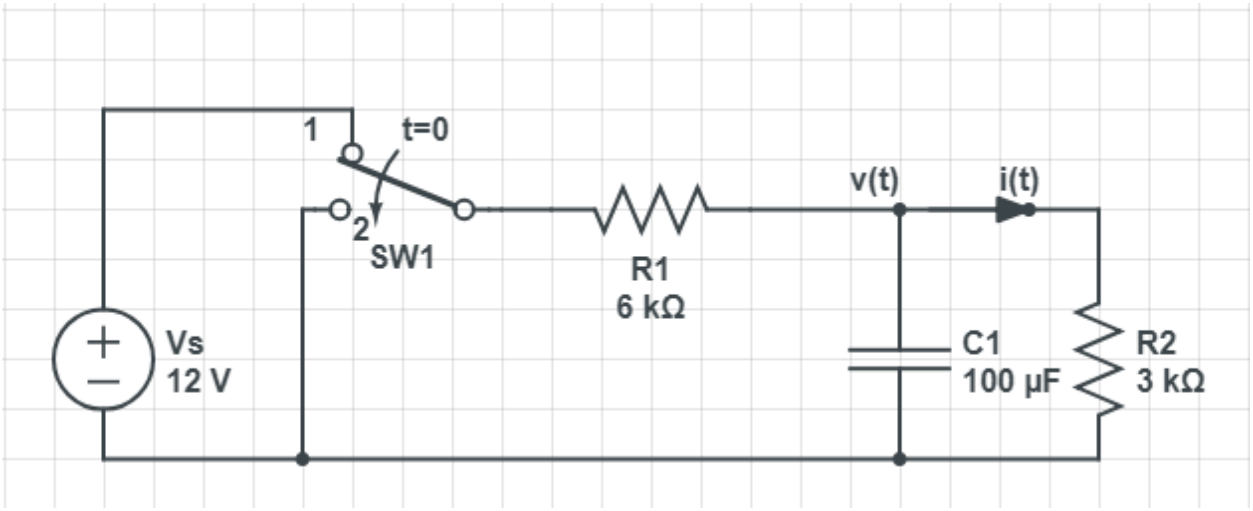
Fall 2018: EE-240 Circuits I
Assignment # 04
Due Date: 22 November 2018, Thursday

Please read the following instructions:

- Submit the assignment on A-4 sheets bound together. Please note that assignments submitted from torn notebook pages will not be accepted.
- You are required to submit the assignment at the start of class on the due date. Late submissions will not be accepted.
- Please ensure that you have clearly written your name and roll numbers on the assignment.
- The assignment is long, so you are advised to start as soon as possible. Please note that no deadline extension requests will be entertained.
- You are aware of the LUMS honor code and therefore, any plagiarism attempts will be directly reported to the Disciplinary Committee. If you are facing any difficulties or have questions, ask the course staff (Instructor/TA), they are there to help you.

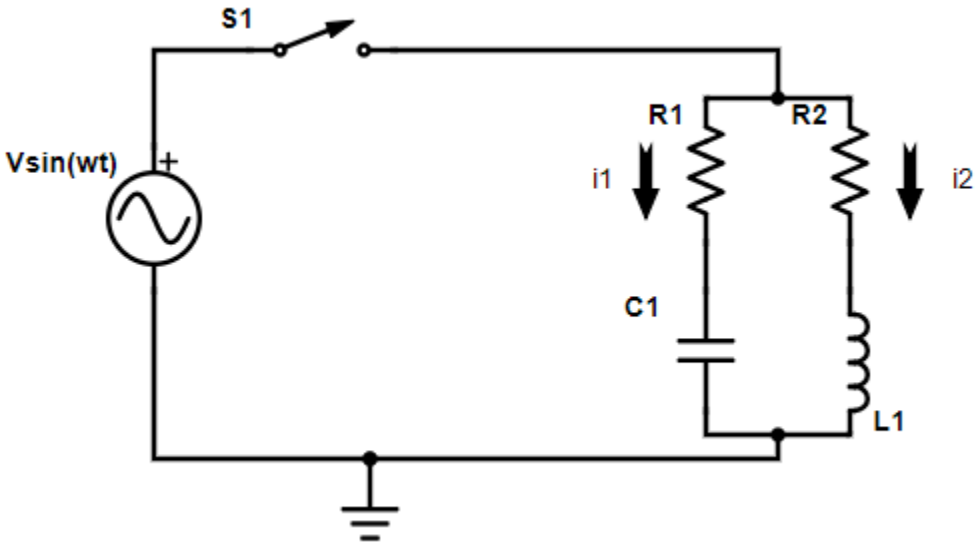
The total marks for the assignment are **100.**

Q1: The switch SW1 has been in position 1 for a long time. At t=0, the switch moves to position 2. Calculate i(t) for t>0. [10]

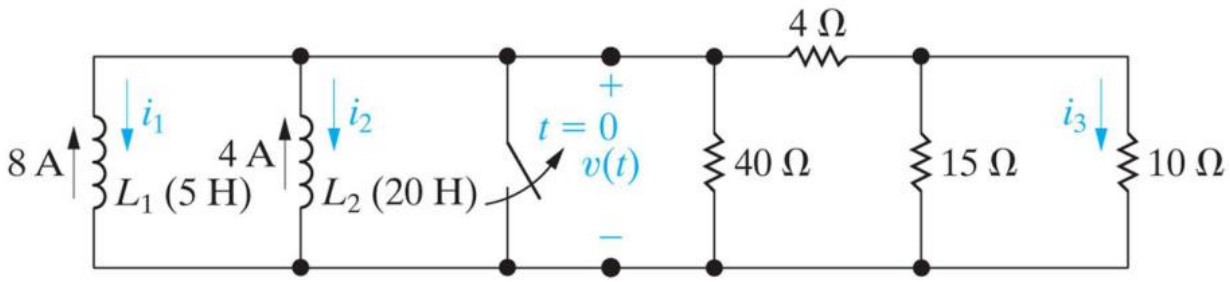


Q2: Switch S1 is closed at t=0. Find:

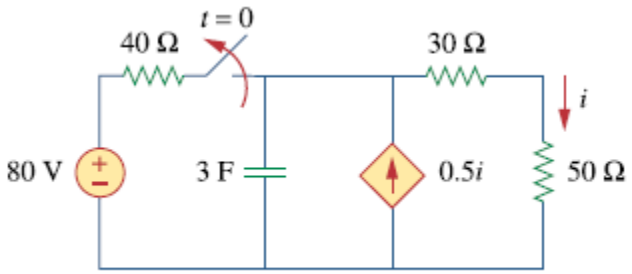
a) di_1/dt at $t=0^+$ [5]
b) di_2/dt at $t=0^+$ [5]



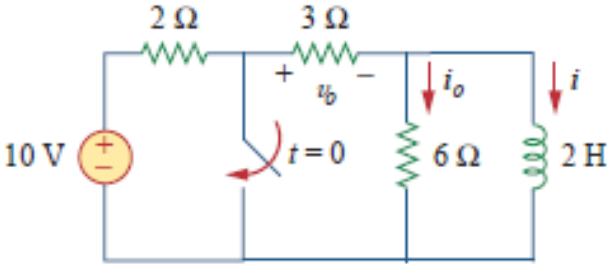
Q3: The switch is closed for t<0. The initial currents and their directions through each inductor are shown in the diagram below. At t=0, the switch is opened. Calculate $i_1(t)$, $i_2(t)$ and $i_3(t)$ for t>0. Also describe, both quantitatively and qualitatively, what happens as when t->∞. [20]



Q4: The switch is closed for long time and opened at t=0. Find $i(0^-)$ and i(t) and for t>0. [10]



Q5: In the circuit shown below, find i_o, v_o and $i(t)$ for all time, assuming the switch was open for a long time. Also sketch $i(t)$ and i_o on a same graph. [10]

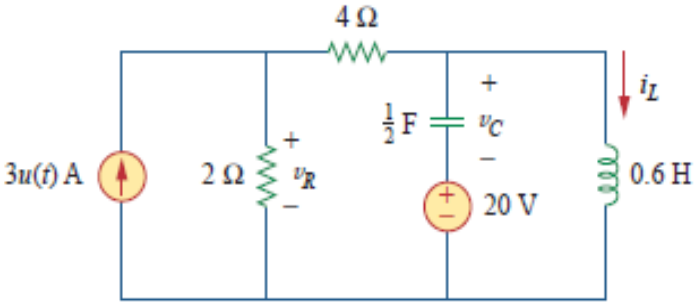


Q6: In the circuit given below, calculate: [15]

a) $i_L(0^+)$, $v_c(0^+)$, $v_R(0^+)$

b) $di_L(0^+)/dt$, $dv_c(0^+)/dt$, $dv_R(0^+)/dt$

c) $i_L(\infty)$, $v_c(\infty)$, $v_R(\infty)$

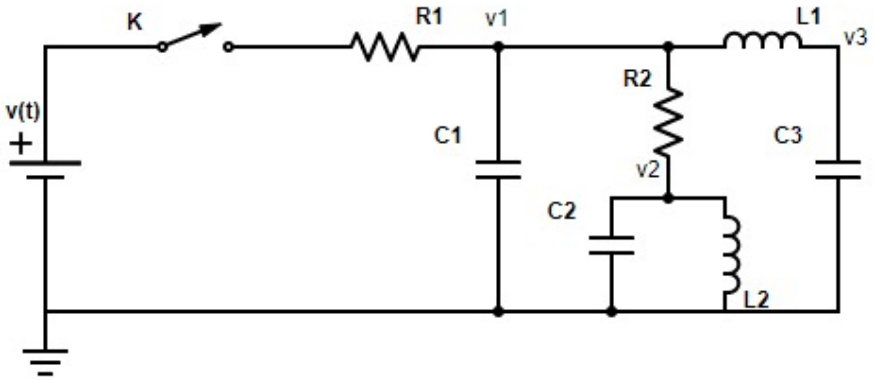


Q7: In the network given below, the switch K is closed at t = 0. At t =0^-, all capacitor voltages and inductor currents are zero. Three node-to-datum voltages are identified as v_1, v_2 and v_3. Find:

a) v_1 and dv_1/dt at t = 0^+ [5]

b) v_2 and dv_2/dt at t = 0^+ [5]

c) v_3 and dv_3/dt at t = 0^+ [5]



Q8: The network below reaches a steady state with the switch K open. At t = 0, switch K is closed. Find *i*(t) for the numerical values given, sketch the current waveform, and indicate the value of the time constant. [10]