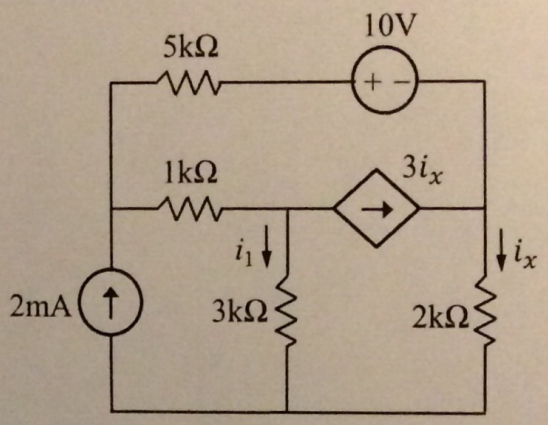
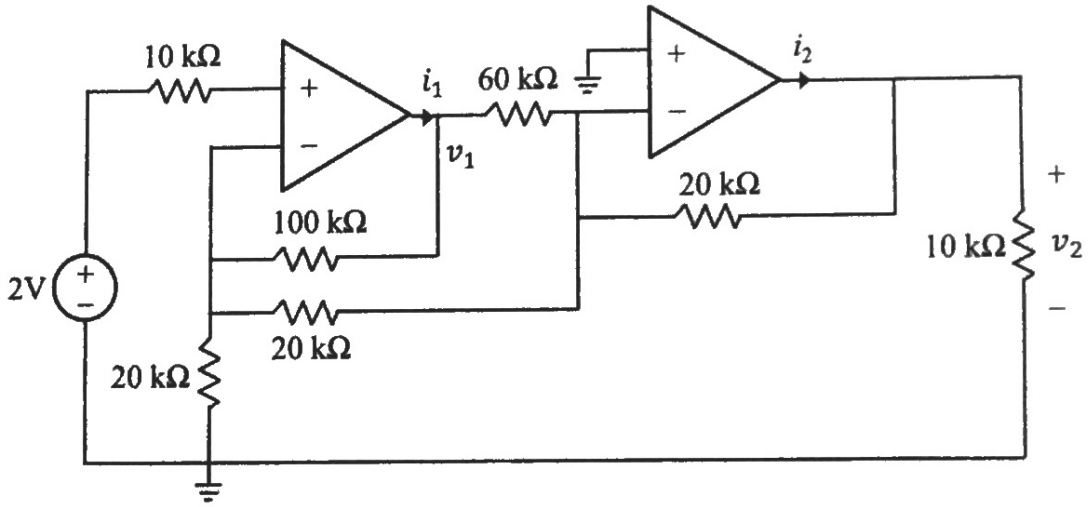
3. **(25 points)** Find the current i_1 in the circuit using **mesh analysis**.



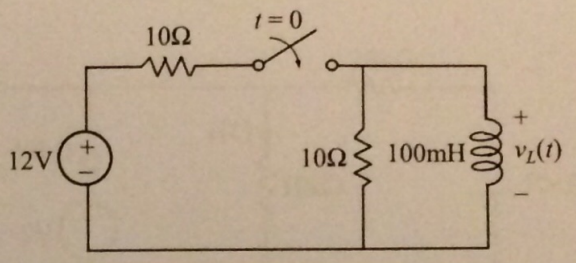
Show your work clearly and box your final answers with proper units for full credit.

Part 3: Problems. Show your work clearly and box your final answers with proper units for full credit.

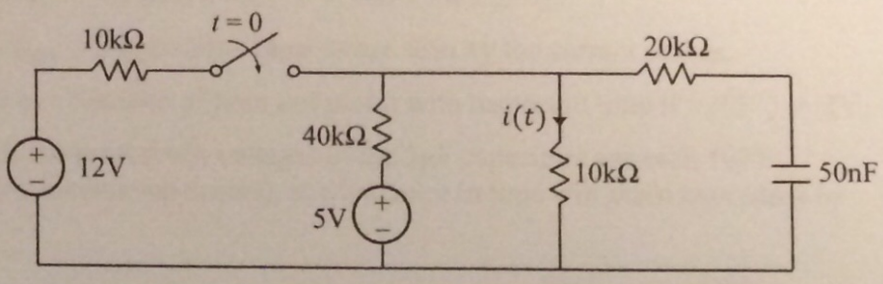
1. **(25 points)** Assuming ideal op amps, determine v_1, v_2, i_1, and i_2 in the circuit below.



2. **(25 points)** The switch has been open a long time. At $t = 0$, the switch closes. Find $v_L(t)$ for $t > 0$.



3. **(25 points)** The switch has been open a long time. At $t = 0$, the switch closes. Find $i(t)$ for $t < 0$ and $t > 0$.



4. **(25 points)** Consider the network of capacitors connected to the current source that is turned on at $t = 0$ ($u(t)$ is the unit step function, which is 0 for $t < 0$, and 1 for $t \geq 0$).

   a) **(10 points)** Determine C_{ab}, the equivalent capacitance seen by the current source.

   b) **(10 points)** Find $v_C(t)$ as a function of time and plot it with respect to time if $v_C(0^-) = 2\text{V}$,

   c) **(BONUS: +2 points)** If the breakdown voltages of the 2μF capacitors are each 100V (beyond which dielectric breakdown occurs), at what point in time will these capacitors be damaged?