# Homework 4

Due time: 11 p.m. Nov. 14th, 2024

Turn in your hard-copy hand-writing homework at the entrance of Room 3-324 SIST #3 Building.

Rules:

- Work on your own. Discussion is permissible, but extremely similar submissions will be judged as plagiarism.

- Please show all intermediate steps: a correct solution without an explanation will get zero credit.

- Please submit on time. No late submission will be accepted.

- Please prepare your submission in English only. No Chinese submission will be accepted.

- All final answers must be rounded to **two decimal places**.

1. In the circuit below, notice that $u(t)$ means the step function, you need to find:

   (a) $v(0+)$ and $i(0+)$

   (b) $\dfrac{dv(0+)}{dt}$ and $\dfrac{di(0+)}{dt}$
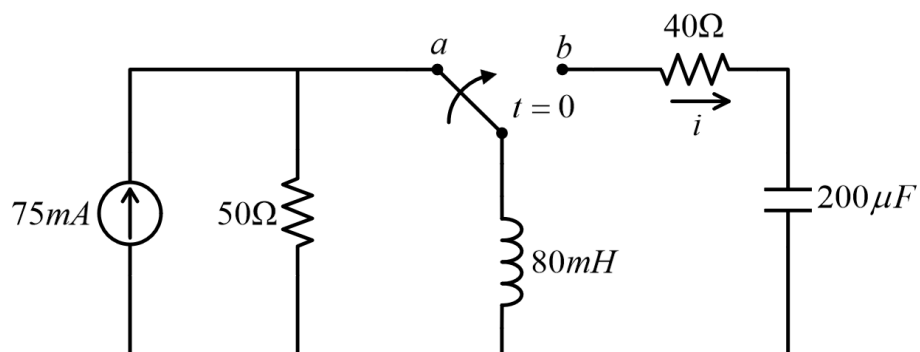
   (c) $v(\infty)$ and $i(\infty)$
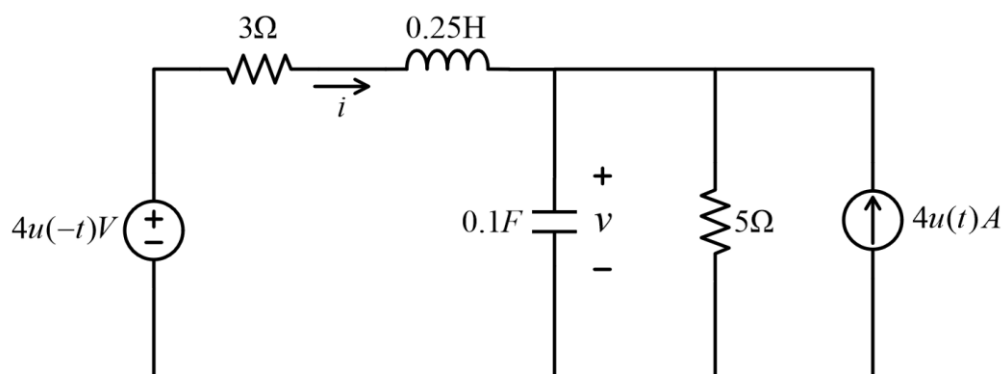
2. The switch in the circuit has been in position a for a long time. At t = 0, the switch moves instantaneously to position b.
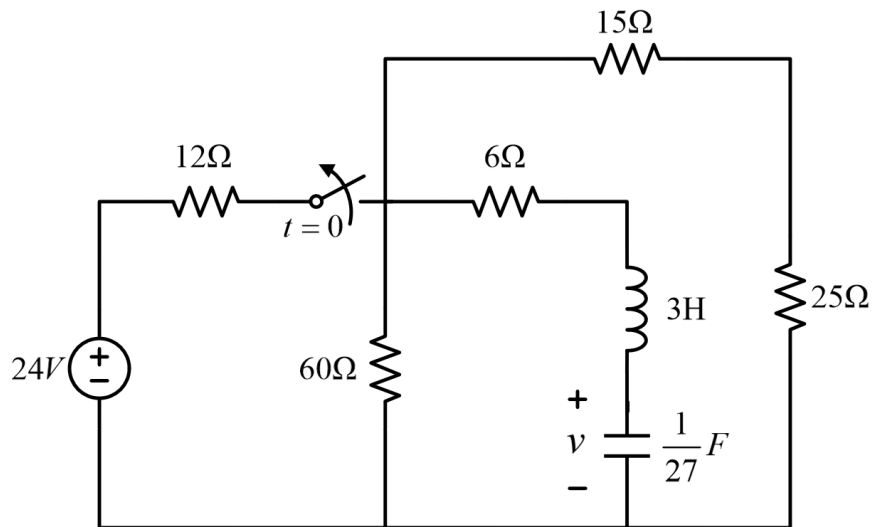
    (a) Find $i(0+)$
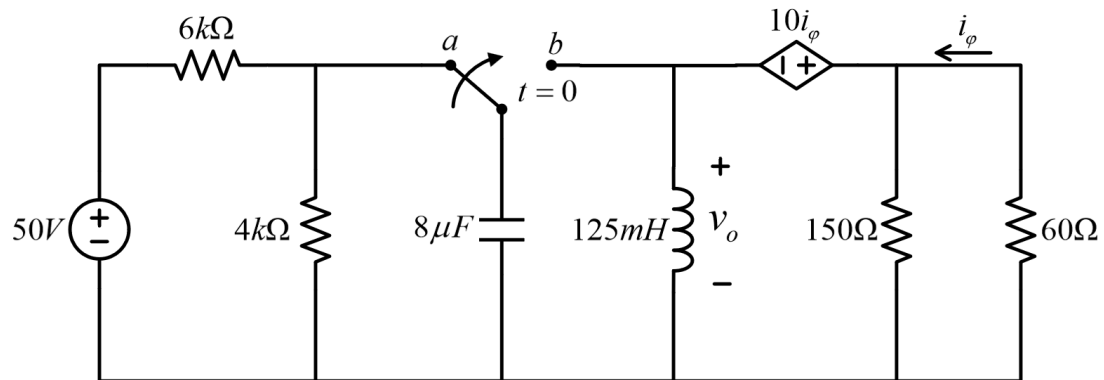
    (b) Find $\frac{di(0+)}{dt}$

   (c) Find the expression of $i(t)$ for $t > 0$.

3. Calculate $v(t)$ for $t > 0$ in the circuit. (Hint: you can apply the Thevenin Equivalent Circuit to simplify the circuit)

4. The switch moves from position a to b at t = 0. Find $v_o(t)$ for $t > 0$. (Hint: you can apply Thevenin Equivalent Circuit to simplify the circuit)
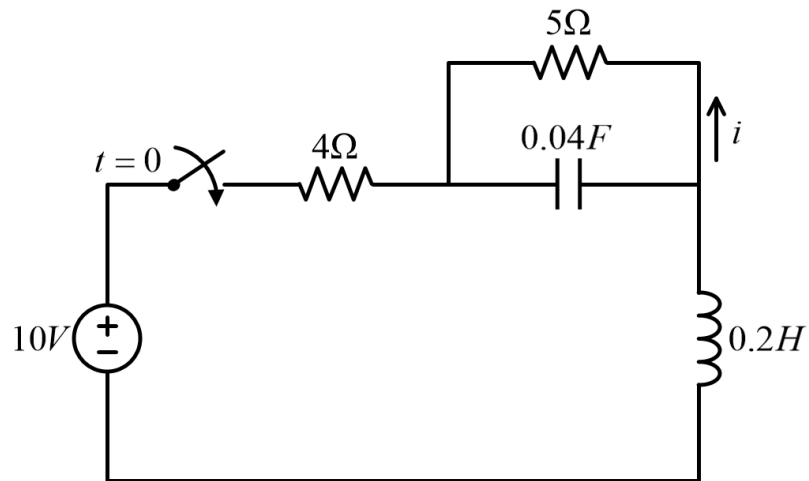
5. The initial energy stored in the circuit is zero. Find v_o for $t \geq 0$. The response is overdamped, critically damped or underdamped?
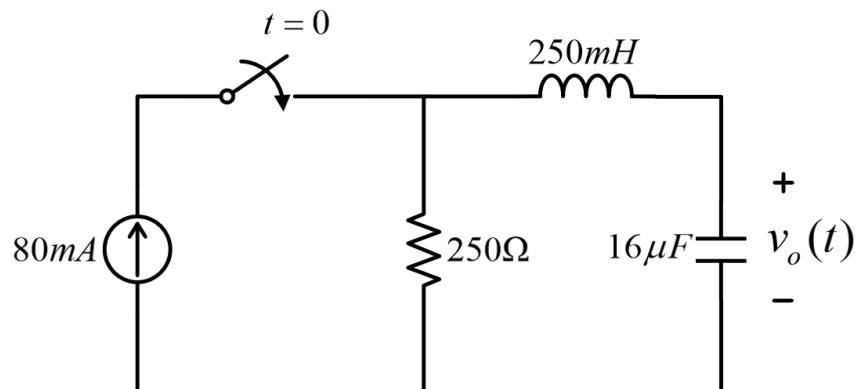
6. Switch S_1 has been in position a and switch S_2 has been closed for a long time. At t=0, switch S_1 is moved instantaneously to position b, and switch S_2 is opened at the same time. Find $v_c(t)$ for $t > 0$.
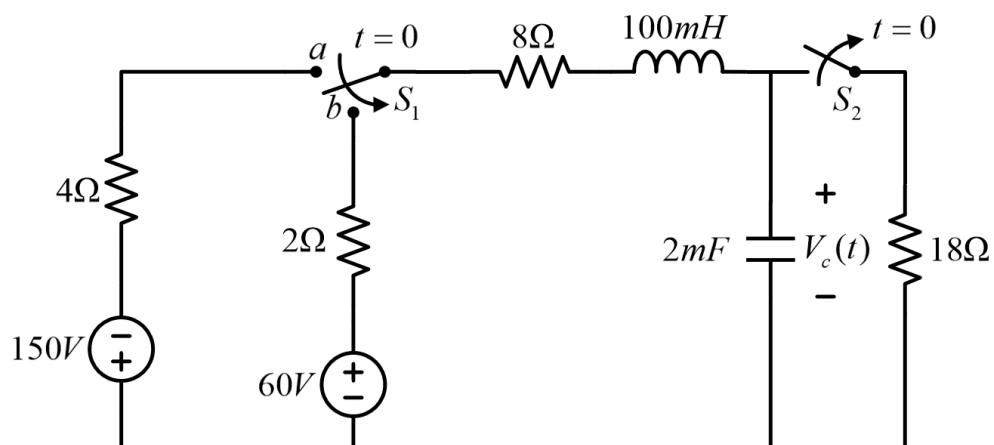
7. In the circuit below, find $i(t)$ for $t > 0$.

8. Obtain $i_1(t)$ and $i_2(t)$ for $t > 0$ in the circuit.