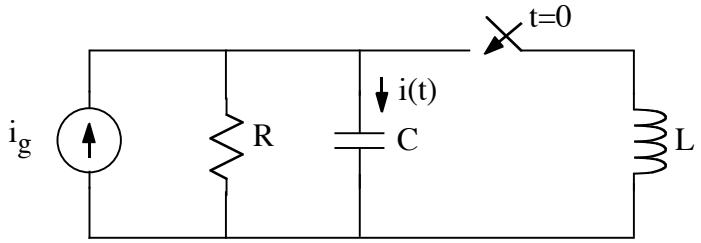
HOMEWORK #2

1.



After being open for a long time, the switch closes at t = 0.

The inductor carries no current at time $t = 0^-$.

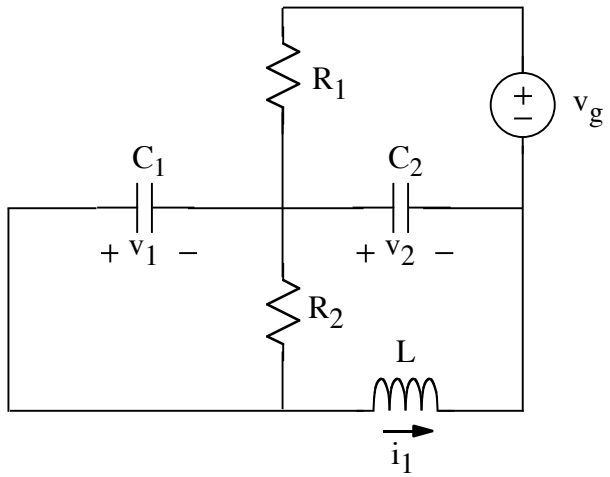
Give expressions for the following in terms of i_g, R, L, and C:

$$i(t = 0^+) \qquad \text{and} \qquad \left.\frac{di(t)}{dt}\right|_{t=0^+}$$

2. Find the numerical values of L and R given the following information:

$$C = 5\ \mu\text{F} \qquad s_1 = -10\text{k rad/s} \qquad s_2 = -40\text{k rad/s}$$

3.



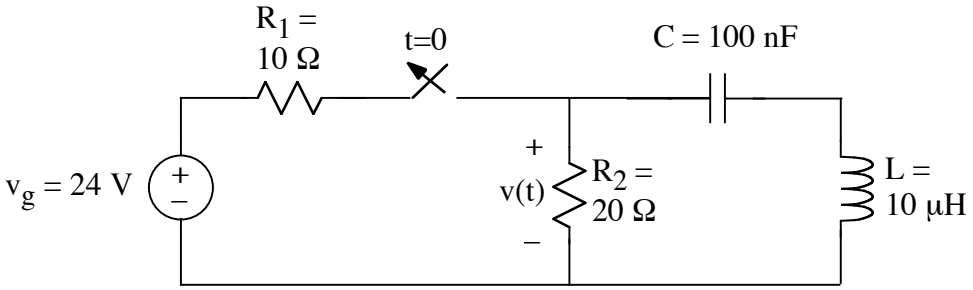
At t = 0, $v_g(t)$ switches instantly from $-v_o$ to v_o.

Write the state-variable equations for the circuit in terms of the state vector

$$\vec{x} = \begin{bmatrix} v_1 \\ v_2 \\ i_1 \end{bmatrix}$$

4. Evaluate the state vector at $t = 0^+$.

5.



After being closed for a long time, the switch opens at t = 0.

a) State whether v(t) is underdamped, overdamped, or critically damped.

b) Write a numerical time-domain expression for v(t), $t > 0$, the voltage across R_2. This expression must not contain any complex numbers.