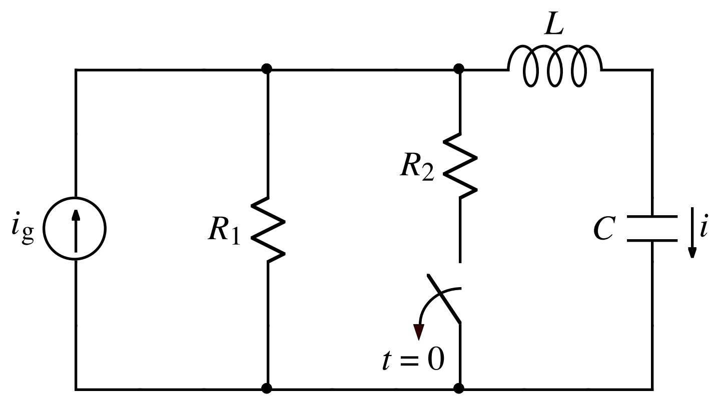
HOMEWORK #2

1.



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

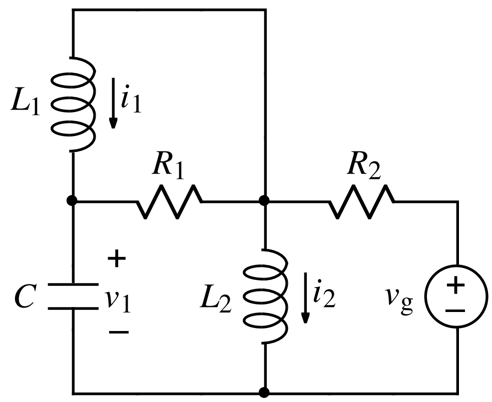
Give expressions for the following in terms of no more than i_g, R_1, R_2 L, and C:

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

2. Find the numerical values of L and C for the above circuit, given the following information:

$R_1 = 384\ \text{m}\Omega$ $R_2 = 192\ \text{m}\Omega$ $\alpha = 24\ \text{kr/s}$ $\omega_d = 7\ \text{kr/s}$

3.



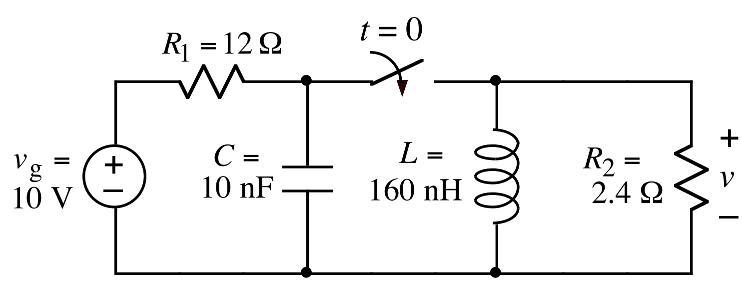
At $t = 0$, $v_g(t)$ switches instantly from $-v_o$ to v_o.

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

$$\vec{x} = \begin{bmatrix} i_1 \\ i_2 \\ v_1 \end{bmatrix}$$

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

4.



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

State whether $v(t)$ is under-damped, over-damped, or critically-damped.

5. Write a numerical time-domain expression for $v(t)$, $t > 0$, the voltage across R_2 in problem 4. This expression must not contain any complex numbers.