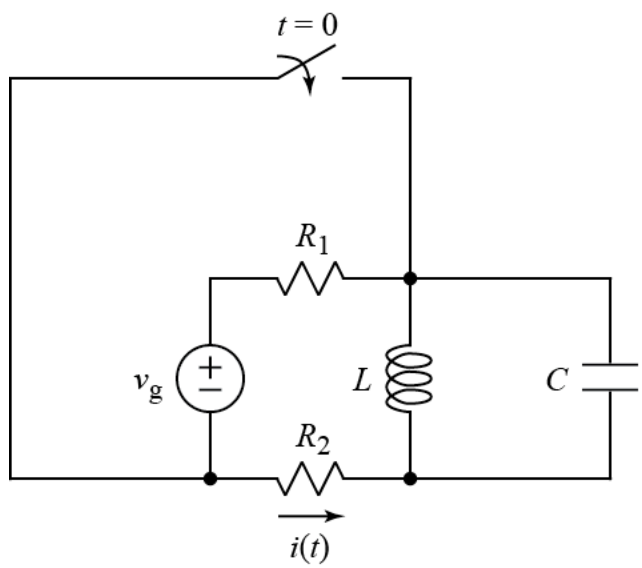
# HOMEWORK #2

1.




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

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

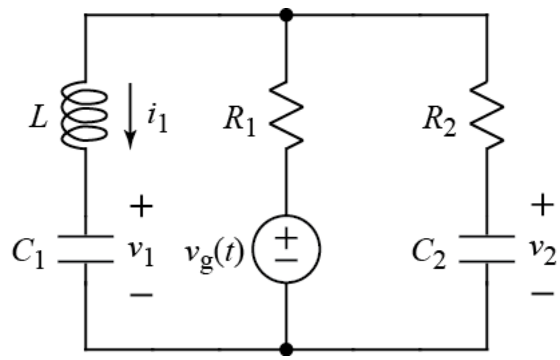
$i(t = 0^+)$ and $\left.\frac{di(t)}{dt}\right|_{t=0^+}$

2. Find the numerical value of $R_2$ given the following information:

$R_1 = 150\ \Omega$ $\quad L = 40$ mH $\quad C = 3.2\ \mu$F

$\alpha = 1250$ r/s $\quad \omega_d = 2500$ r/s

3.



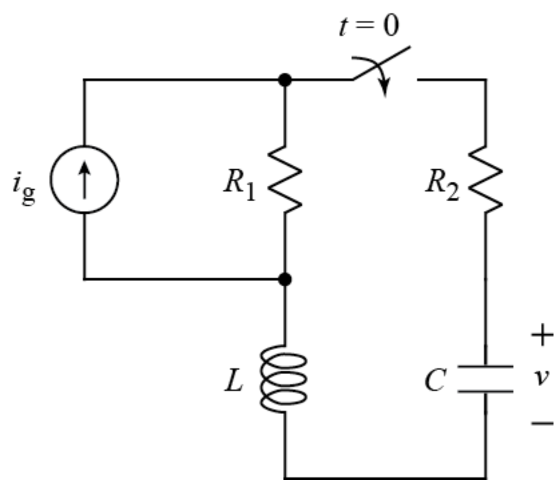

At $t = 0$, $v_g(t)$ switches instantly from $-v_o$ to $v_o$.

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

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

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

4.




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

$i_g = 0.2$ A $\quad R_1 = 50\ \Omega \quad R_2 = 12.5\ \Omega \quad L = 10$ mH $\quad C = 16\ \mu$F

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 $C$. This expression must not contain any complex numbers.