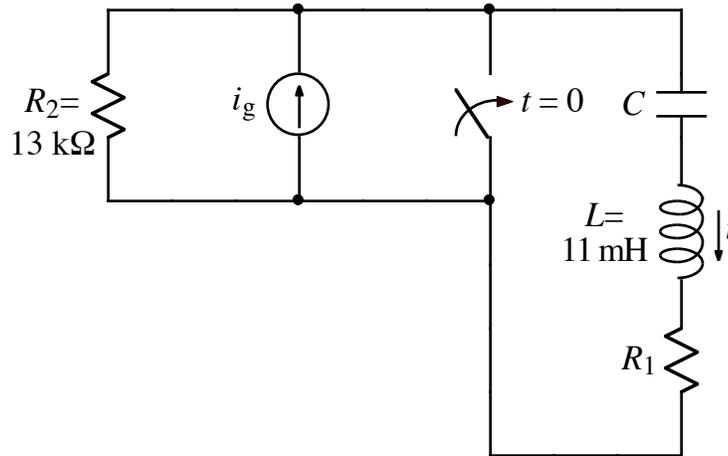


1.



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

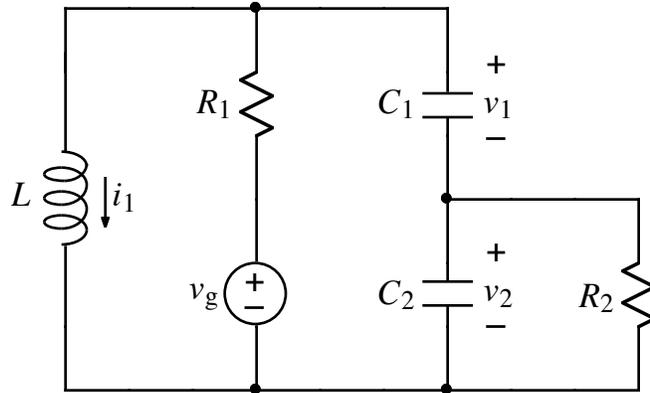
Give expressions for the following in terms of at most  $i_g$ ,  $R_1$ ,  $R_2$ ,  $L$ , and  $C$ :

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

2. Find the numerical values of  $R_1$  and  $C$  to yield the following values of characteristic roots for the above circuit:

$$s_1 = s_2 = -1.5 \text{ Mr/s}$$

3.



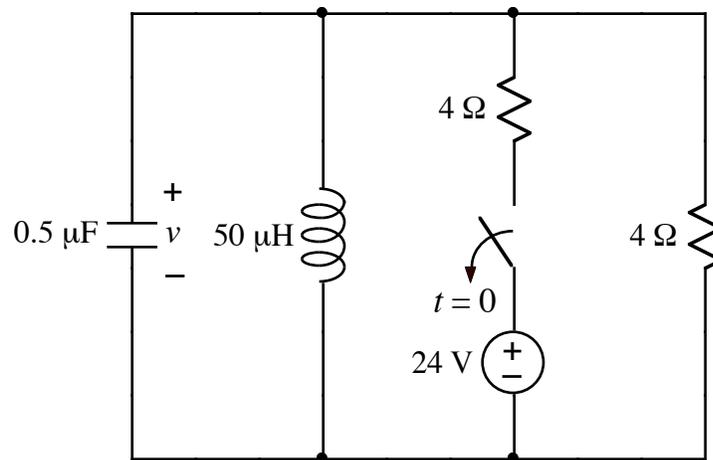
At  $t = 0$ ,  $v_g(t)$  switches instantly from  $-v_o$  to  $v_o$ .

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

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

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

4.



After being closed for a long time, the switch opens 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  $C$  in problem 4. This expression must not contain any complex numbers.