

EECE 2210 - Electrical Engineering

Quiz 10

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Student Name: _____

The figure shows an RLC circuit powered by a current source. The switch has been opened for a long time and is closed at $t = 0$. In this case, the source current is $i_s = 10 \text{ ma}$, the capacitor is $5 \mu\text{F}$ and the inductor is 10 mH . The resistor is for you to determine to produce a damping ratio of $\zeta = 0.5$.

1. What is the initial voltage, $v_0(0^-)$?

_____ .

2. What is the final voltage, $v_0(\infty)$?

_____ .

3. What is the frequency, $f_0 = \omega_0/(2\pi)$?

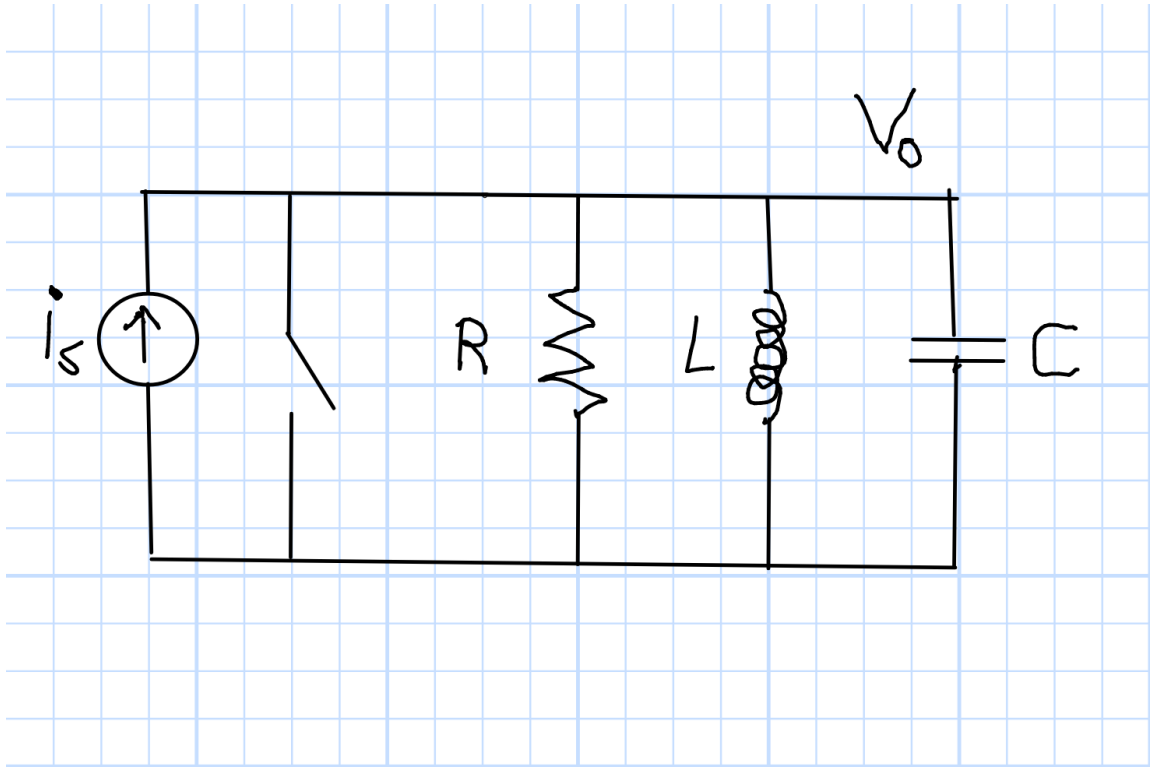
_____ .

4. What is the natural frequency, $f_n = \omega_n/(2\pi)$?

_____ .

5. What is the resistance, R , that will make this happen?

_____ .



1. What is the initial voltage, $v_0(0^-)$?

Zero.

2. What is the final voltage, $v_0(\infty)$?

Zero.

3. What is the frequency, $f_0 = \omega_0 / (2\pi)$?

$$\omega_0 = \frac{1}{\sqrt{LC}}. \quad f_0 = \frac{\omega_0}{2\pi} = 712 \text{ Hz.}$$

4. What is the natural frequency, $f_n = \omega_n / (2\pi)$?

$$\omega_n = \sqrt{\omega_0^2 - \alpha^2}. \quad f_n = \frac{\omega_n}{2\pi} = 616 \text{ Hz.}$$

5. What is the resistance, R , that will make this happen?

$$R = \frac{1}{2\alpha C} = 45 \text{ Ohms.}$$