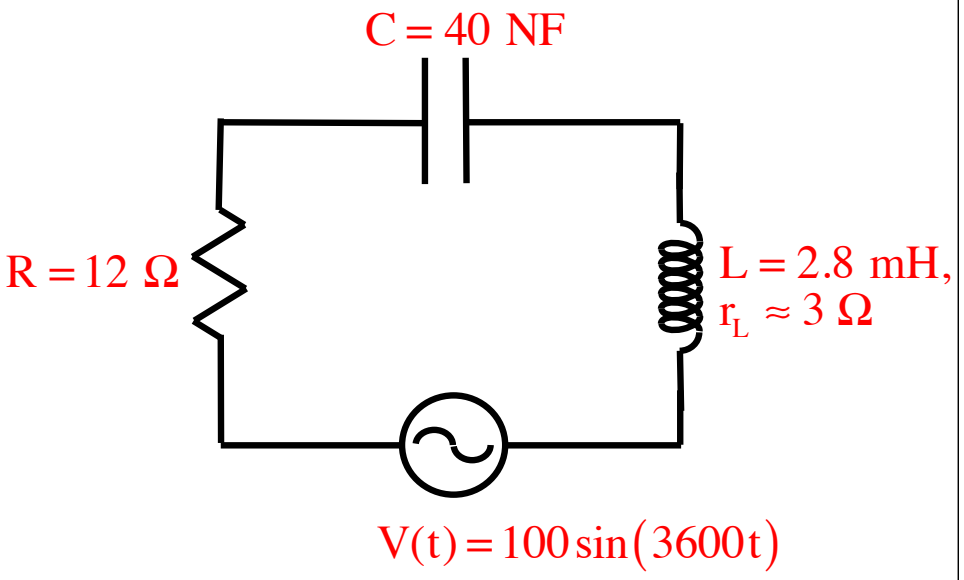
3.) RLC circuit:

Consider the RLC circuit shown to the right.



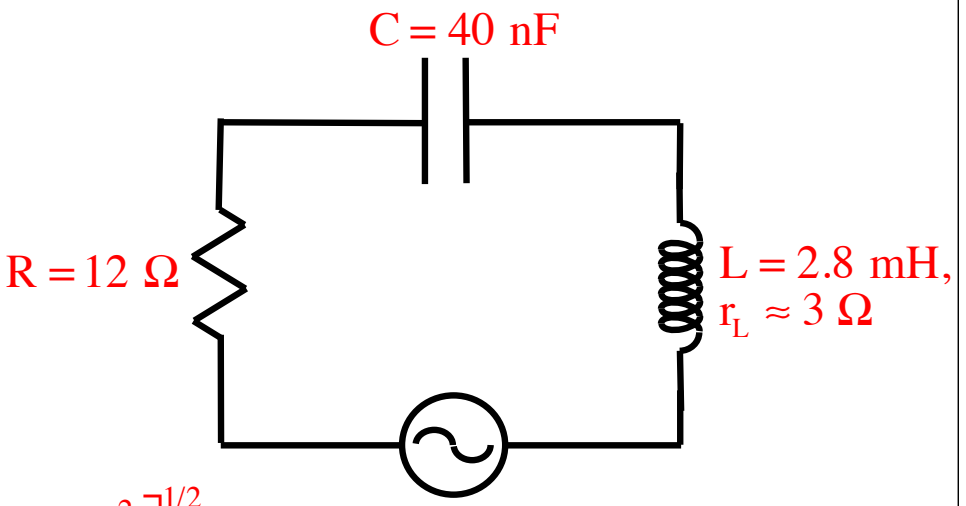
a.) What is the circuit's impedance?

b.) What is the circuit's current?

c.) What is the circuit's resonance frequency?

3.) RLC circuit:

Consider the RLC circuit.



a.) What is the circuit's impedance?

$$Z = \left[\left(R + r_L \right)^2 + \left(X_L - X_C \right)^2 \right]^{1/2}$$

$$= \left[\left(12\ \Omega + 3\ \Omega \right)^2 + \left(1.76 \text{x} 10^{-2} - 6.94 \text{x} 10^{3} \right)^2 \right]^{1/2}$$

$$= 6.94 \text{x} 10^{3}\ \Omega$$

b.) What is the circuit's resonance frequency?

$$\nu = \frac{1}{2\pi} \sqrt{\frac{1}{LC}} = \frac{1}{2\pi} \sqrt{\frac{1}{\left(2.8 \text{x} 10^{-3} \text{H} \right) \left(40 \text{x} 10^{-9} \text{F} \right)}}$$

$$= 1.5 \text{x} 10^{3}\ \text{Hz}$$

c.) What is the circuit's current at the resonance frequency?

As the *inductive reactance* and *capacitive reactance* add to zero at resonance, the current will simply be due to the circuit's frequency independent resistor-like resistance, or:

$$i_{RMS} = \frac{V_{RMS}}{R_{net}} = \frac{(70.7\ \text{V})}{(15\ \Omega)}$$

$$= 4.71\ \text{A}$$