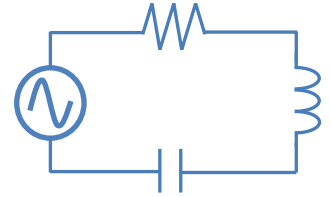


## CONCEPT: LRC CIRCUITS IN SERIES

- In a series LRC circuit, the \_\_\_\_\_ through each element is the same



- In a DC circuit, we would simply say that  $V_{LRC} = V_L + V_R + V_C$ , since they are all in series
  - In an AC circuit, this isn't true, since the maximum voltages occur at different times

- In a series LRC circuit, the MAXIMUM voltage is

$$- V_{LRC} = \underline{\hspace{2cm}}$$

- The IMPEDANCE,  $Z$ , acts like the effective reactance of the circuit.

- In a series LRC circuit, the impedance is

$$Z = \sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

→ The maximum current produced by the source is given by  $i_{MAX} = \underline{\hspace{2cm}}$

EXAMPLE: A circuit is formed by attaching an AC source in series to an 0.5 H inductor, a 10  $\Omega$  resistor and a 500  $\mu\text{F}$  capacitor. If the source operates at a  $V_{\text{RMS}}$  of 120 V and a frequency of 60 Hz, what is the maximum current in the circuit?

### **PRACTICE: VOLTAGE IN A SERIES LRC AC CIRCUIT**

An AC source operates at an RMS voltage of 70 V and a frequency of 85 Hz. If the source is connected in series to a  $20\ \Omega$  resistor, a 0.15 H inductor and a 500  $\mu\text{F}$  capacitor, answer the following questions:

- a) What is the maximum current produced by the source?
- b) What is the maximum voltage across the resistor?
- c) What is the maximum voltage across the inductor?
- d) What is the maximum voltage across the capacitor?