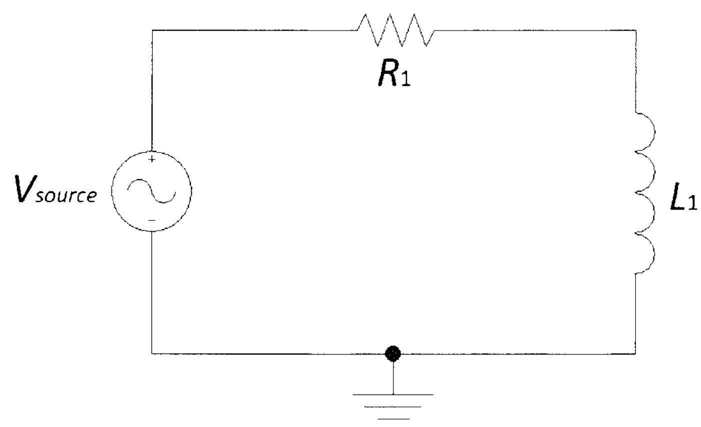
Experiment:

i. Given the following circuit, with $R_1 = 100\Omega$, $L_1 = 1\text{mH}$, and an input waveform $V_{source} = \cos(\omega t)$, with a frequency of 100kHz, calculate the current through the inductor with respect to time.



ii. Build the circuit from part i in Capture CIS Lite, and excite the circuit with a sinusoidal waveform with a frequency FREQ = 100kHz, an amplitude VAMPL = 1V, VOFF = 0, and AC = 0. Set the simulation time to 200μs and add a trace for the inductor voltage and the current through the inductor. Set the x-axis to user defined, 80μs to 110μs. (This allows the inductor current to reach steady state conditions). Include a screenshot in your report.

iii. What is the amplitude of the inductor current based on your simulation results?

iv. Build the circuit from part i on a breadboard, with the same attributes for R_1, L_1, and the source voltage. Using the oscilloscope tool, plot the inductor voltage on channel 1, and the inductor current using a math channel. Include a screenshot in your report.

v. Using a vertical measurement in the oscilloscope tool, measure the phase difference between the inductor voltage and the inductor current.

vi. How do the three waveforms (calculated, simulated, actual) compare with one another?

vii. What occurs in a series RLC circuit when the input is set to the resonance frequency?