## 9.3.1: State Variable Model of Series RLC Circuits (50 points total)

1. In the space below, provide a diagram of the circuit (figure 1). Include on your diagram the measured values for the resistor and the capacitor (if available). (2 pts)
2. In the space below, provide your state variable model for the circuit, as determined in pre-lab part (a). (4 pts)
3. Attach, to this worksheet, your plots of the simulated state responses vs. time and the simulated state trajectory. (With nominal component values.) (6 pts)
4. **DEMO**: Have a teaching assistant initial this sheet, indicating that they have observed your circuit’s operation. (9 pts total)

* Circuit operates; both states measured (5 pts)
* TA checkout of state space model calculated in pre-lab (4 pts)

**TA Initials: \_\_\_\_\_\_\_**

1. Post-lab exercises. Attach, to this worksheet, the following:
   1. A plot overlaying the measured output response vs. time – y(t) – with the simulated output response from the pre-lab. (7 pts)
   2. Plots overlaying the post-lab simulations (incorporating the measured component values and accounting for the inductor resistance) with the measured data. The plots should include:
      1. Simulated and measured system states as functions of time (8 pts)
      2. Simulated and measured state trajectories. (7 pts)
2. In the space below, provide a comparison between the measured and simulated step responses (e.g. a maximum difference between the measured and simulated responses) and discussion of measured vs. simulated step responses and state trajectories (include at least one possible source of any differences between the measured and simulated results). (7 pts)