Lab #2
Due Tu. 11/20

Please prepare a lab report which records your circuit schematic, hand analysis, circuit measurements, and a picture of your working circuit for each of the experiments.
When performing measurements with the digital multimeter, it is easier not to use the switch. Instead use wires to make connections.

1. Reading

   Introduction to Capacitors (pg 18-19), Introduction to Diodes (pg 24), The Inductor (pg 40-41)

2. Experiment #8: Slow Light Bulb

   (a) Calculate the charge and discharge time constants for the initial configuration (3.3 kΩ, 10 kΩ, and 100 µF).

   (b) How long should it take to fully charge the capacitor?

   (c) How long should it take to completely discharge the capacitor?

3. Experiment #11: Make Your Own Battery

   (a) Calculate the amount of time you expect to see the light on. **Hint**: You will want to remember the general first-order circuit equation.

   (b) Repeat the calculation using another capacitor and resistor combination.

4. Experiment #12: One-Way Current

   (a) Using the offset model of a diode and the typical "on" voltage of a diode and LED, calculate the current in the circuit.

   (b) In forward-biased configuration, measure the voltage across the diode. Does it match the typical "on" voltage? Also, measure the current in the circuit.

   (c) In reverse-biased configuration, measure the voltage across and current through the diode.

5. Experiment #26: The Anti-Capacitor

   Explain why the LED only lights up for a short amount of time. It will be helpful to examine the simplified circuit (Fig. 1) where you assume the LED does not affect the circuit, it merely measures the voltage across the inductor.

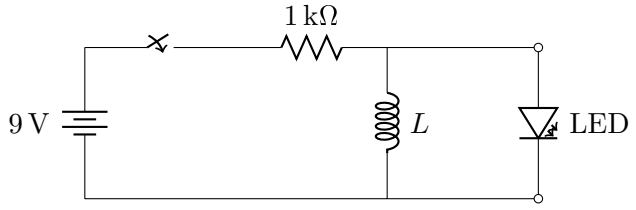

Figure 1: Simplified Inductor Circuit