Lab #0
Due Tu. 10/16

Please prepare a lab report which records your circuit schematic, hand analysis, circuit measurements, and a picture of your working circuit.

1. Parts List

   All parts are present.

2. Kit Introduction

   For small currents $< 200\,\text{mA}$ use the VΩmA connection on the multimeter. This is the same jack used for voltage.

3. Experiment #1: The Light Bulb

   (a) What is the expected voltage across the LED when it is on?

   Since the LED is a real device, the ideal diode model will not be appropriate. Instead, use the offset diode model and the expected voltage across the LED when it is on is then $0.7\,\text{V}$.

   The actual voltage drop across the LED is $1.63\,\text{V}$.

   (b) Draw the circuit schematic and calculate the current through the $10\,\text{k}\Omega$ resistor.

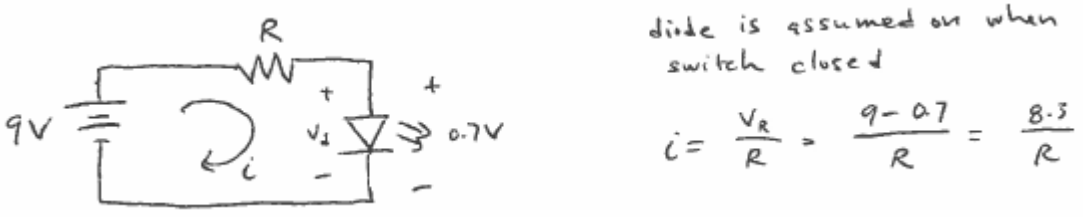

Figure 1: Light Bulb Hand Calculations

   (c) The hand calculations and measured currents are presented below. The circuit is shown in Fig. 2.

Ω	i^{calc} [mA]	i^{meas} [mA]	v_R^{meas}	v_D^{meas} [V]
10k	0.83	0.81	8.22	1.63
1k	8.3	8.1	7.83	1.82
100k	0.083	0.085	8.42	1.52

4. Resistors

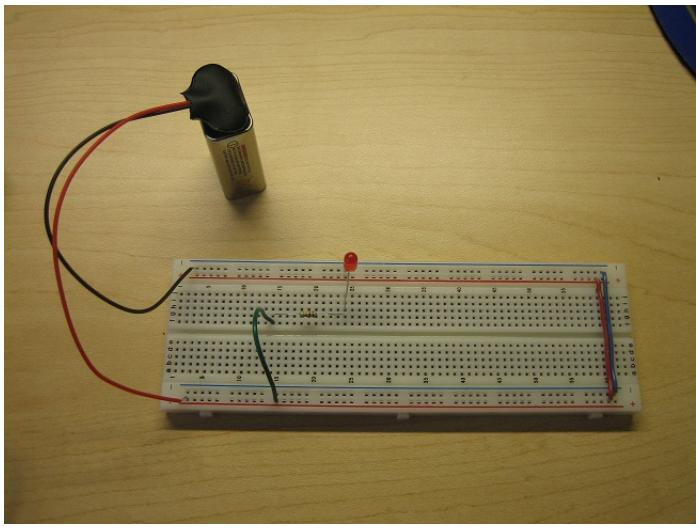

Figure 2: Light Bulb Circuit

5. Experiment #2: The Brightness Control

   The measured voltage across the 1k resistor is 1.59 V and the current in the circuit is 1.65 mA. This results in a calculated resistance for the variable resistor of 3.98 kΩ. The measured resistance is 3.84 kΩ. The circuit is presented in Fig. 4

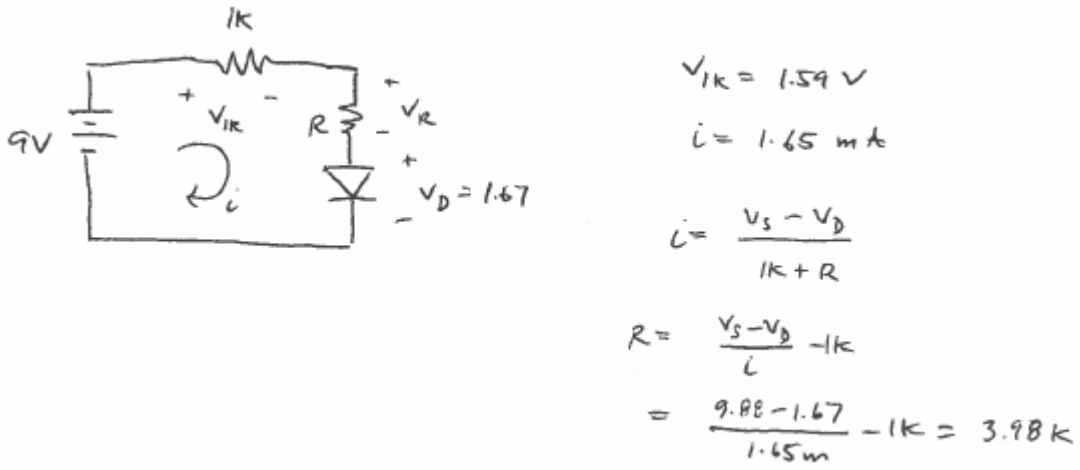

Figure 3: Brightness Contol Circuit Hand Calculations

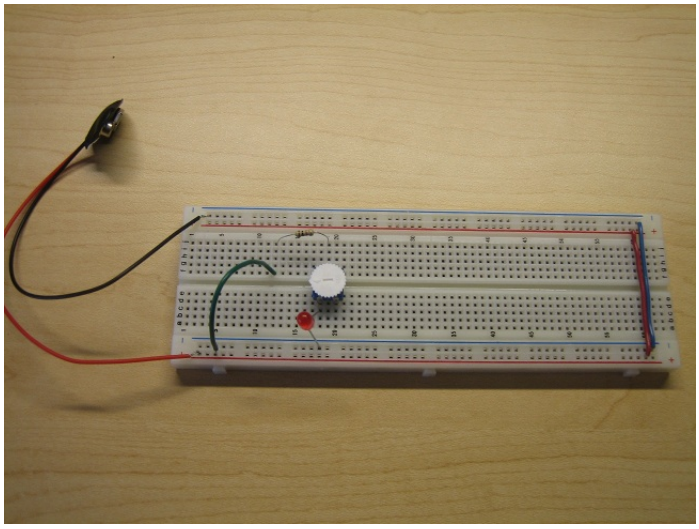

Figure 4: Brightness Control Circuit