

## P2.W2 – DC Circuits

1. If you were to plot the voltage versus the current for a given circuit, what would you expect the slope of the line to be? If now the resistance of the circuit were a function of temperature would you still expect to see a straight line when plotting voltage versus current if the temperature was allowed to vary?
2. What is a conductor? How is the conductivity related to resistance? How does conductivity of a regular conductor (like a copper wire) change with temperature? Why? (Hint: think about how electrons collide with vibrating atoms.)
3. What does it mean physically for something to have resistance? What does it mean for a battery to have internal resistance? How can the internal resistance  $r$  be determined from measurement of the voltage  $V$  across the terminals of the battery and the current  $I$  through an external resistor  $R$  in terms of the aforementioned variables and the EMF of the battery  $\varepsilon$ ? Please draw a diagram of the setup, and explain the procedure using words and equations when necessary.