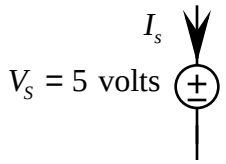
ECE 109L - THE VERY BASICS - LAB 3
VOLTAGE SOURCES

SUMMER 2007 **A.P. FELZER**

OBJECTIVE

The objective of this lab is to see how close real voltage sources like the following are to being ideal



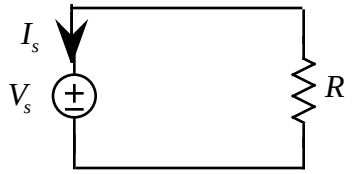
LAB

1. **PreLab** - Describe in words what it means for a voltage source like the one above to be ideal

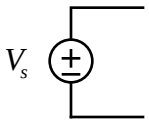
2. **PreLab** - Draw a graph of V_s as a function of I_s for an ideal 5 volt voltage source. Describe your curve

3. **PreLab** - Obtain at least 5 resistors with different values in the range 100Ω to 10KΩ available for free in the open lab on the fifth floor by the elevators.

4. We now take measurements to see how close the 5-volt source in the lab is to being ideal by measuring how much its voltage V_s changes as we change its current I_s. We get the current I_s to change by connecting different resistors R across the source as follows



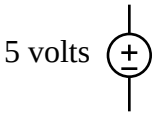
   a. **PreLab** - Redraw the above circuit with the current meter inserted to measure I_s. Be sure to indicate the colors of the leads
   b. **PreLab** - Redraw the above circuit with the volt meter connected to measure V_s. Be sure to indicate the colors of the leads
   c. First measure the voltage across the 5 volt source as follows



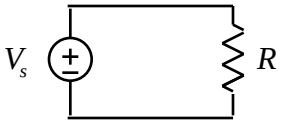
      before any resistors are connected
   d. Now measure V_s and then I_s for each of your resistors R connected to the source as follows

d. Plot your data points on a graph of V_s as a function of I_s. Draw a best fit line through your data points
e. Over what range of currents I_s does your data enable you to say that your voltage source is reasonably ideal

5. Suppose the voltage across a 5 volt voltage source as follows

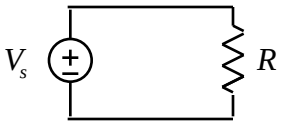


falls to $V_s = \dfrac{R}{R+100}\,5$ when we connect a resistor R as follows



For what values of R will $V_s \geq 0.9(5) = 4.5$ volts

6. Suppose we want 5 volts across a resistor R in a real circuit as follows



Would you first set the voltage source to 5 volts and then connect the resistor or connect the resistor and then set your voltage source to 5 volts. Why