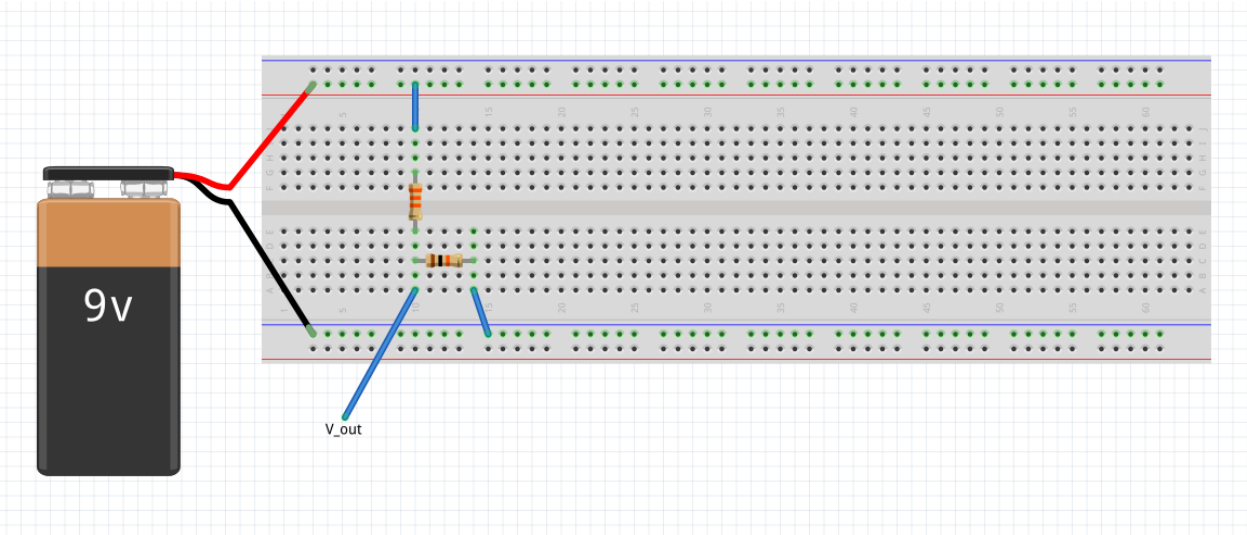
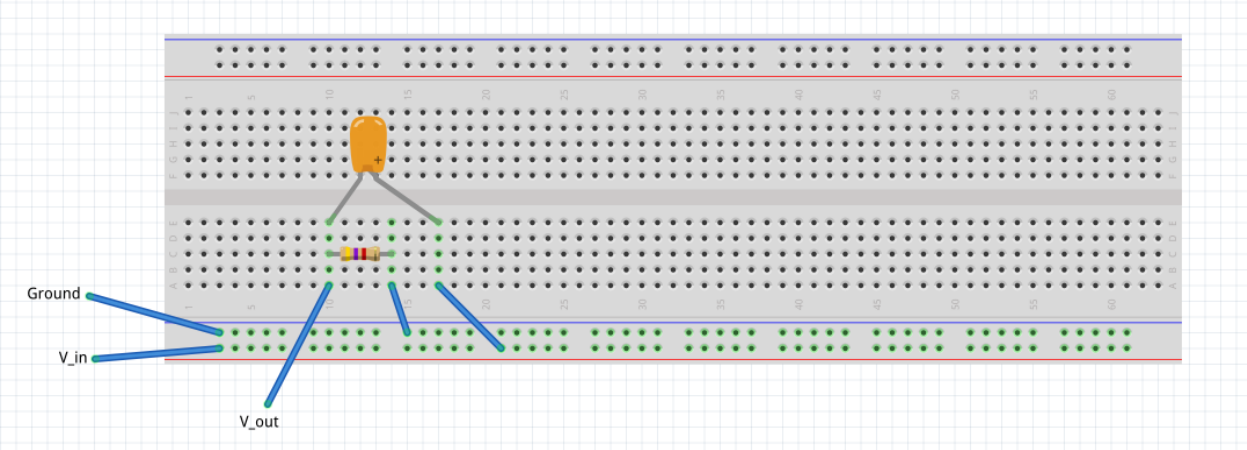
BioE 101 Lab 1 Prelab Questions

1. Oscilloscopes
    a. Read through this tutorial to learn about oscilloscopes: https://learn.sparkfun.com/tutorials/how-to-use-an-oscilloscope
    b. The model of the Oscilloscope we will be using in our labs is HP/Agilent 54616B. Look up the spec sheet for the oscilloscope online and answer the following questions (Question 2.1 & 2.2 from the Lab manual):
        i. 2.1: What is the bandwidth of the oscilloscope? What does that mean for the signals you will be able to observe with it? What the sampling rate of the ADC inside the scope have to be in order to achieve this bandwidth?
        ii. 2.2: What is the input impedance of the scope? Why would that matter?
2. Breadboard and simple circuit analysis
    a. Voltage divider circuit:



        i. Draw the circuit schematic from the breadboard view above, with labeled resistor values (use the chart in the lab protocol). The bands for the vertical resistor are orange, orange, orange, and gold. The bands for the horizontal resistor are brown, black, orange, and gold.
        ii. What is V_out with reference to ground?

b. First order filter circuit:



i. Draw the circuit schematic from the breadboard view above. The value of the capacitor is 1 microfarad. The resistor band colors are yellow, violet, red, gold.
ii. What is the transfer function (V_out/V_in)?
iii. What type of filter is this, and what is the cut-off frequency? Draw a Bode plot of the filter (feel free to use MATLAB or Octave (http://octave-online.net/) to plot).

3. MyDAQ Specifications
   a. First, watch a short tutorial video of MyDAQ online at http://decibel.ni.com/content/docs/DOC-13041
   b. Google “NI MyDAQ User Guide and Specifications”, and download the .pdf document. Quickly scan the document to see what it offers.
   c. Answer question 5.1: : What is the bandwidth of the analog inputs? What is the accuracy of the DMM when measuring a DC voltage around 5V? How many bits are in the ADC of the analog inputs? What is the output impedance of the analog outputs?

Come to lab prepared - make sure you read through the entire lab procedure before your section. Otherwise, you may not finish in time.