Lab 1: Voltage, Current, Resistance and Power

Your notebooks must be complete, understandable, and address all activities, design exercises, observations, and questions noted in the laboratory's procedures. Remember to use your notebook as a laboratory journal and record your data, design calculations, notes and scratch work. Make sure to write a conclusion for each exercise and each week.

1. Measure the resistances of a few resistors with an ohmmeter and see how well they match their specified values. Are they within specifications based on their tolerance bands?
2. Construct the resistor network you designed in exercise 1-1. Check to see that the total resistance agrees with your calculation. Put 10V into your device and use an ammeter to see if is draws the expected current. How much power is being consumed, and how would one measure it?
3. Make a voltage divider from 1 kΩ resistors and an input voltage of your choice, say, in the ranges 1 kΩ – 100 kΩ and 2 V – 15 V. Measure the output voltage of this device. Be sure to sketch your experimental setup in your lab notebook! Vary the input voltage and measure the current drawn by the device. Plot your measurements with the voltage on the vertical axis and the current on the horizontal axis. The *equivalent* or *input resistance* of your voltage divider is the slope of the curve. Relate this to the resistors you used to construct the voltage divider.
4. Make your voltage divider from Exercise 1-3. Measure the output voltage and output current for a variety of load resistances. Note how the output voltage changes and compare your results to your calculations. Do the results make sense?
5. Learn to boot your oscilloscope and perform some basic tests. Feel free to consult the scope's manual to help you with the details as needed.
    a. Select default configuration.
    b. Connect a 10X probe to channel 1, connect the ground to the scopes test ground, and connect the probe tip to the calibration test point on the front of the scope. You should see a square wave appear with a 1kHz frequency and 5V amplitude.
    c. Adjust the trim screw on the probe until the edges of the square wave are true (instead of rolling over or overshooting).
    d. Test the probe's calibration.
    e. Zoom in and out on the signal and play with some of the measurements available to you on the scope, (including the FFT feature).