

ME 133 Winter 2022  
Lab 3: *Plotter and Diodes*  
January 27, 2022  
Due: 2/3/2022

Submit a zip file named yourFirstName-Lab1.zip on Canvas with your code, a lab report (following the format in syllabus), and a short video proving the working hardware-software integration.

### Exercise 1

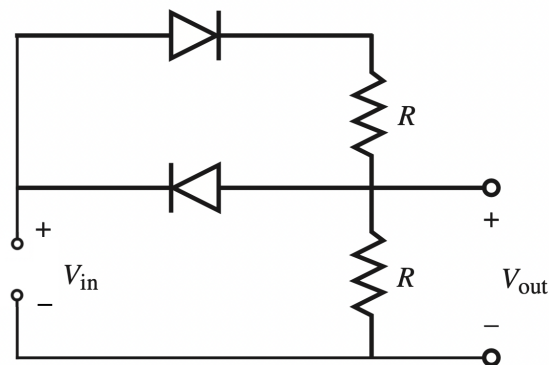
#### Material required

- Arduino
- 2 x 1 K Ohm or 2 K Ohm resistors
- 2 x Diodes

#### Coding together

You already know all it takes to code this problem. We will only look at the Serial Plotter, which is very similar to the Serial Monitor and allows to plot the value of a variable over time.

#### Assignment

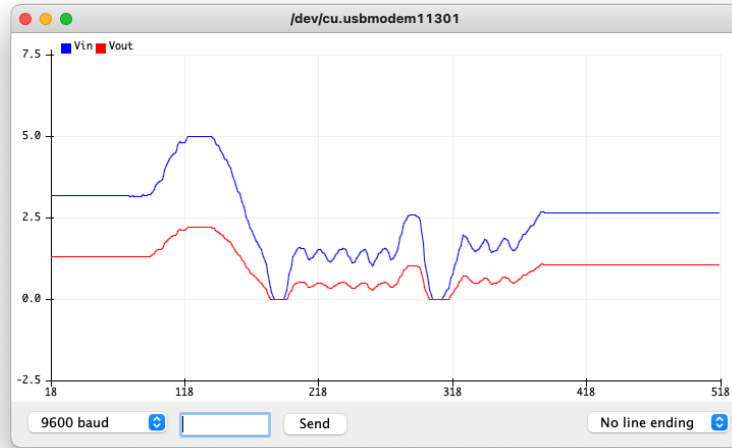


1. **Study** the circuit in the figure above. For a given  $V_{in} > 0$ , what is the value of  $V_{out}$ ? Use either 2 or 1 K Ohm resistors (depending on the ones you received). Attach your calculations to the Report.
2. **Implement** the circuit with a tunable  $V_{in}$  and measure both  $V_{in}$  and  $V_{out}$  with your Arduino. Show both variables on the Serial Plotter (something like in the figure below, notice that the scale on the left is in Volt). Using a potentiometer is the recommended way to create the tunable power supply.
3. **Discuss** your result and whether the hardware implementation confirmed your math.

### Exercise 2

#### Material required

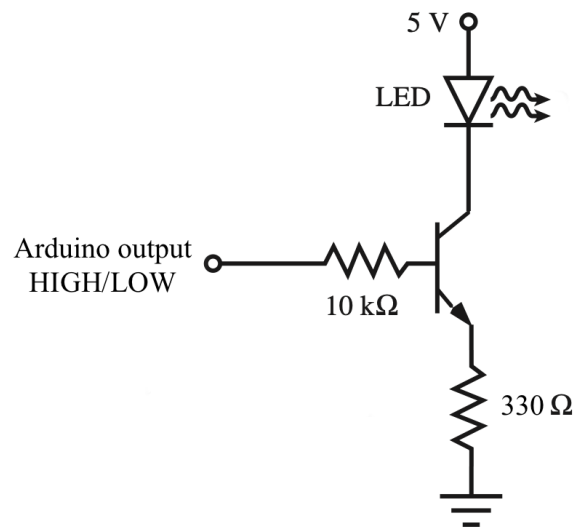
- Arduino
- 1 x Transistor (PN 2222a)
- 1 x 330 Ohm resistor
- 1 x 10 K Ohm resistor



## Coding together

You will fly solo on this one.

## Assignment



Consider the circuit in the figure above. Assume that the LED has a 2 V voltage drop when forward biased. What happens when the Arduino is set to HIGH? What about when its set to LOW? How much current is flowing through the LED in each of the two cases? Motivate your conclusions.

Then, implement the circuit and have the Arduino set the pin connected to it as HIGH and LOW, alternatively. Discuss what happens and whether it matches with what you computed.