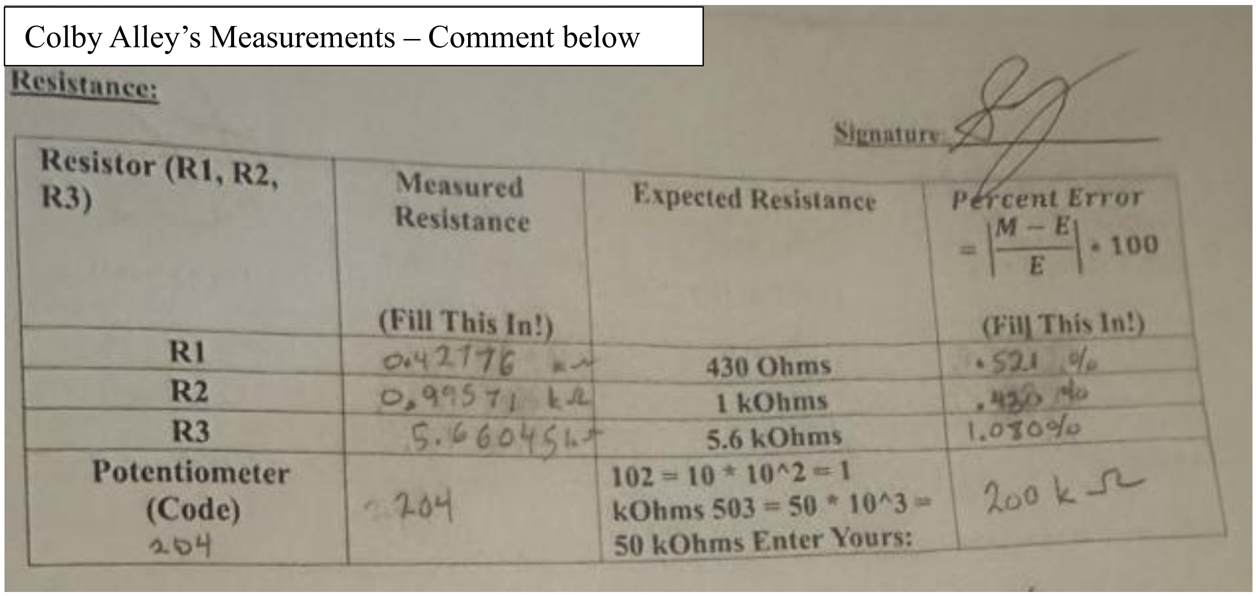
Lab 2 Report | Colby Alley | ECE 1000

The purpose of this lab is to demonstrate the ability to read basic circuits including the demonstration of a voltage divider, current divider, and simple and adjustable LED circuit. The material used in this lab experiment was a basic breadboard, 3 resistors (430 Ohms, 1k Ohms, and 5.6k Ohms), potentiometer, and power supply. Landon Courtney, Miller Kites, and Duncan Killer were other students alongside me.

Part 1: Measuring the Resistors and Potentiometer Values

Colby Alley's Measurements – Comment below



Resistance:

Signature

Resistor (R1, R2, R3)	Measured Resistance (Fill This In!)	Expected Resistance	Percent Error $= \left\|\frac{M-E}{E}\right\| * 100$ (Fill This In!)
R1	0.42776 kΩ	430 Ohms	.521 %
R2	0.99571 kΩ	1 kOhms	.430 %
R3	5.66045 kΩ	5.6 kOhms	1.080%
Potentiometer (Code) 204	204	102 = 10 * 10^2 = 1 kOhms 503 = 50 * 10^3 = 50 kOhms Enter Yours:	200 kΩ

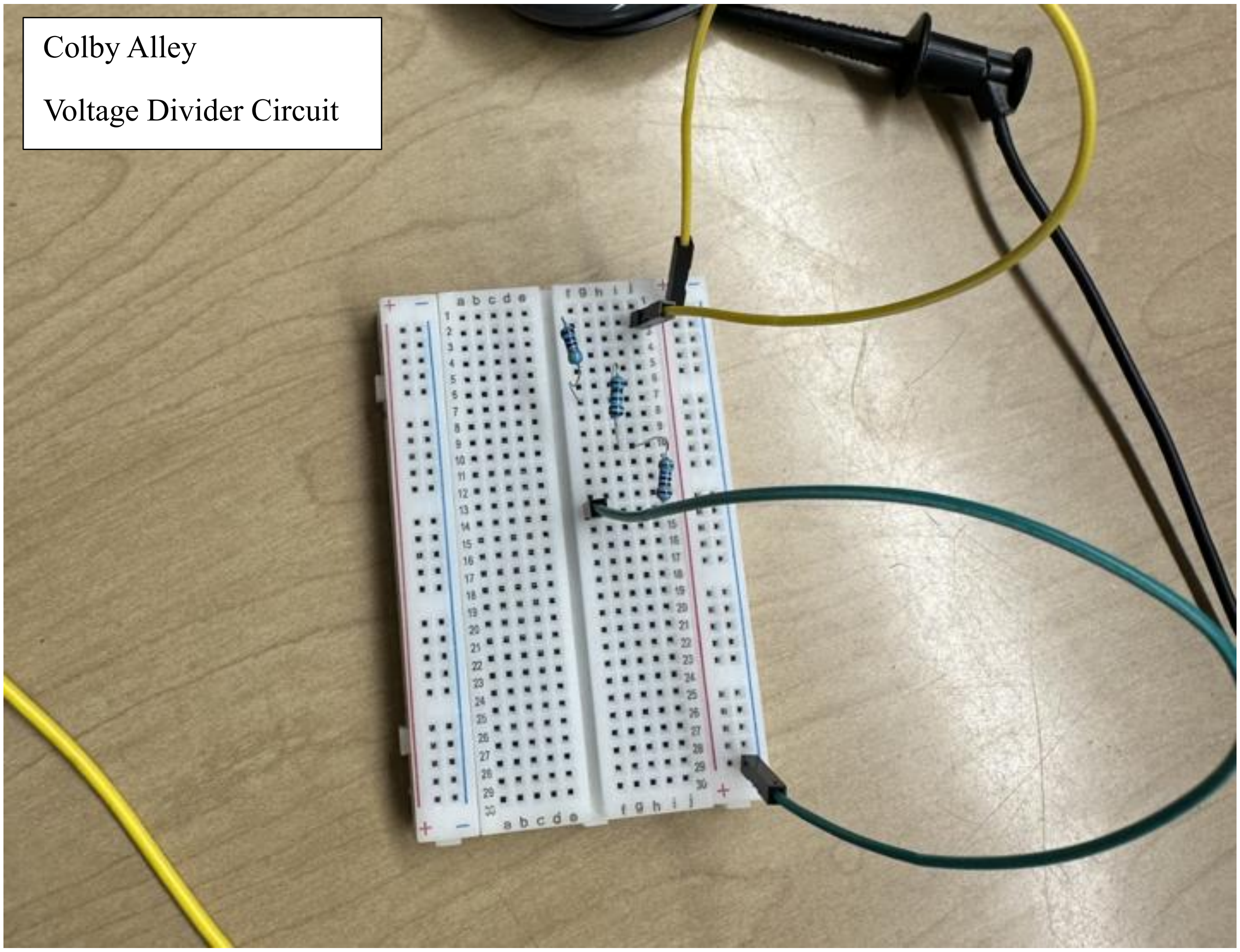
Resistor (R1, R2, R3)	Measured Resistance	Expected Resistance	Percent Error
R1	427.76 Ohms	430 Ohms	0.521 %
R2	0.99571 kOhms	1 kOhms	0.430 %
R3	5.66045 k Ohms	5.6 kOhms	1.080%
Potentiometer (Code)	204	Enter Your Value:	200 kOhms

What are my thoughts:

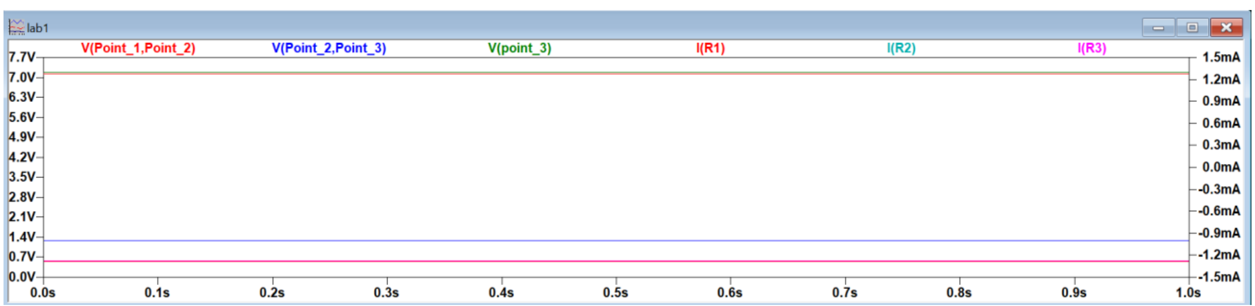
It is cool to see the percent error in the measured resistance versus the expected resistance. Doing the lab and seeing the actual measurements in real-time helps my thought process instead of using only LTSpice.

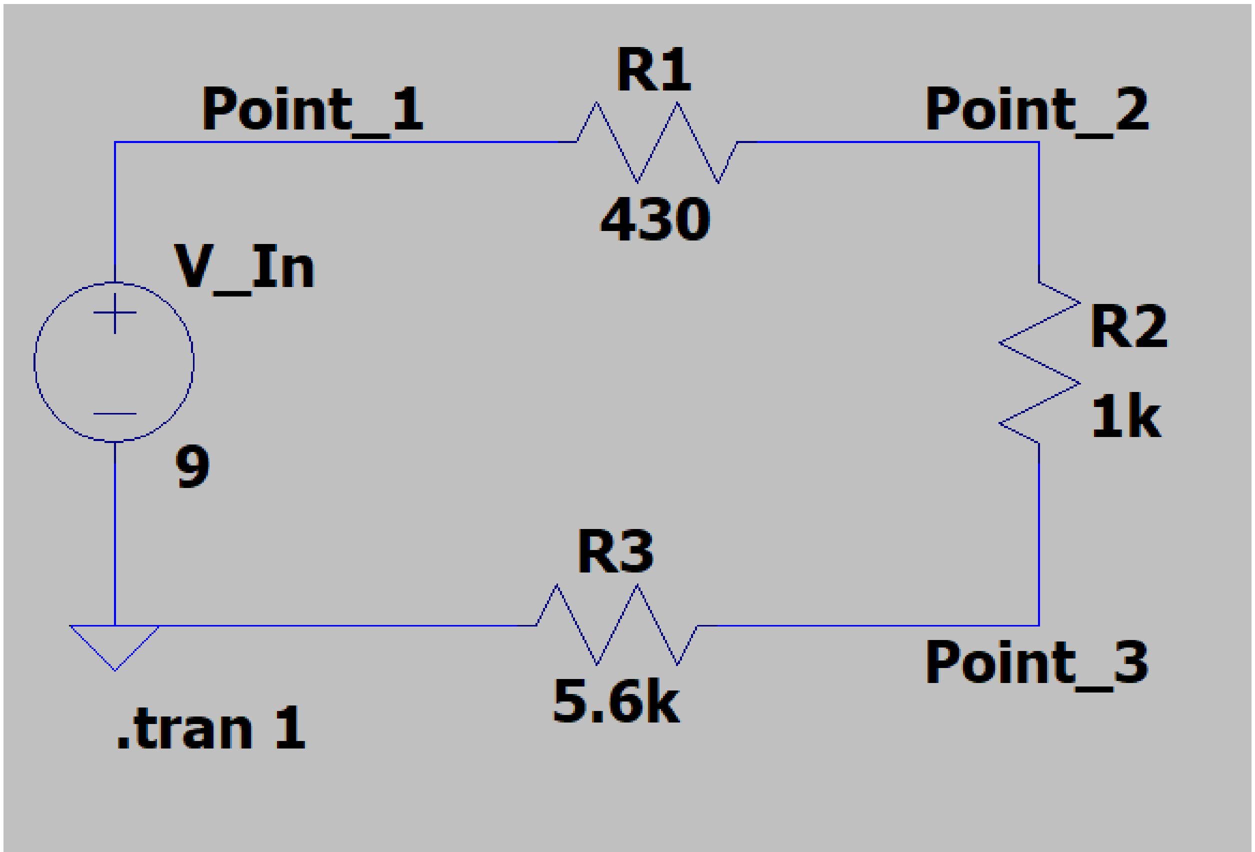
Part 2: Voltage Divider Circuit

Pictures:



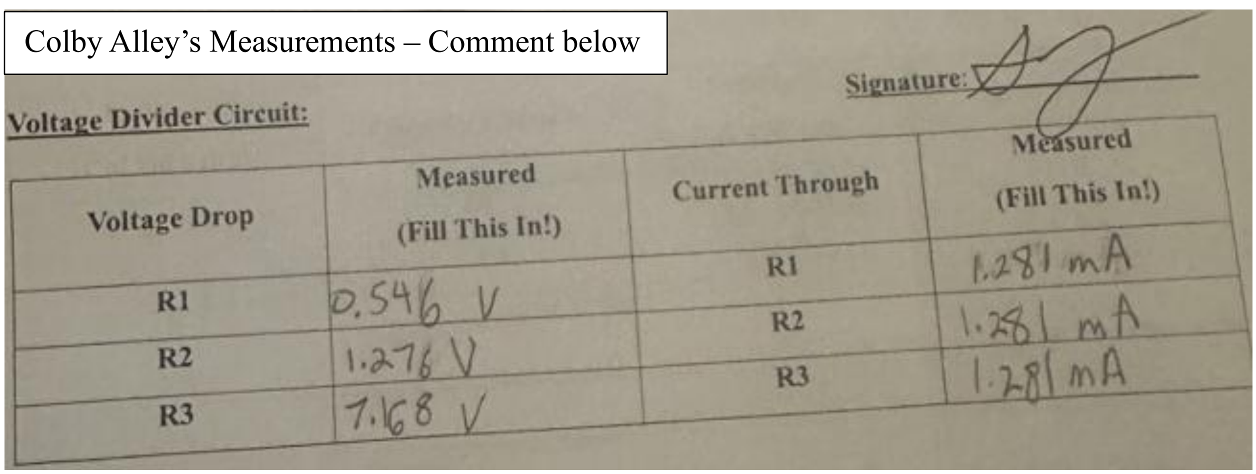
LTSpice simulation:





Colby Alley – Voltage Divider Circuit

Colby Alley's Measurements – Comment below



Voltage Divider Circuit:

Signature:

Voltage Drop	Measured (Fill This In!)	Current Through	Measured (Fill This In!)
R1	0.546 V	R1	1.281 mA
R2	1.276 V	R2	1.281 mA
R3	7.168 V	R3	1.281 mA

Voltage Drop	Measured	Current Through	Measured
R1	0.546 V	R1	1.281 mA
R2	1.276 V	R2	1.281 mA
R3	7.168 V	R3	1.281 mA

What are my thoughts:

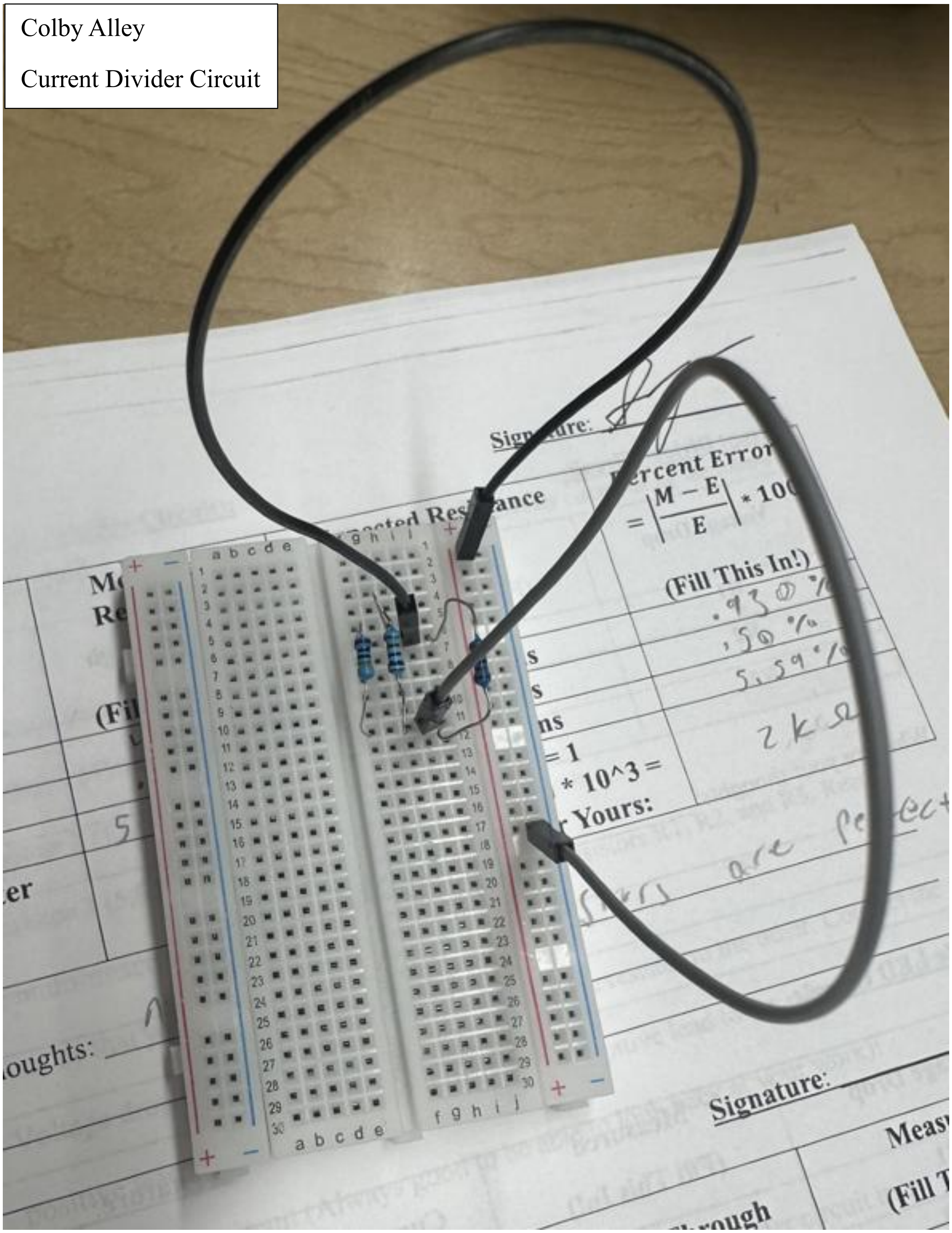
Performing the lab and seeing how it works helps me understand how the different types of dividers work, and I can apply to actual theory problems. One thing I noticed during this lab was the voltage all adds to exactly 8.99 V which is cool to see. Performing the actual lab helps me see where you would connect the leads when measuring certain values.

Part 3: Current Divider Circuit

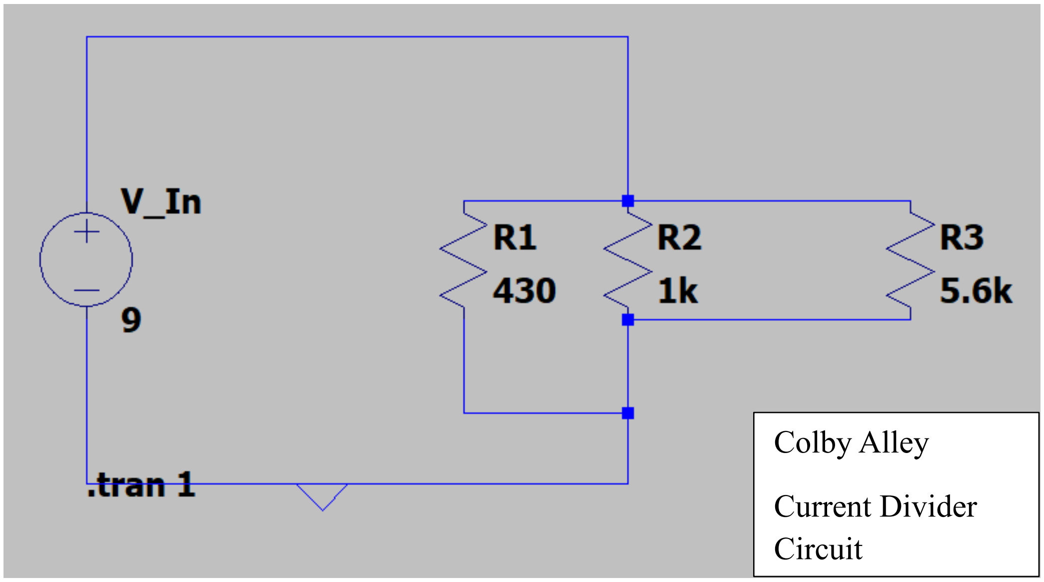
Pictures:

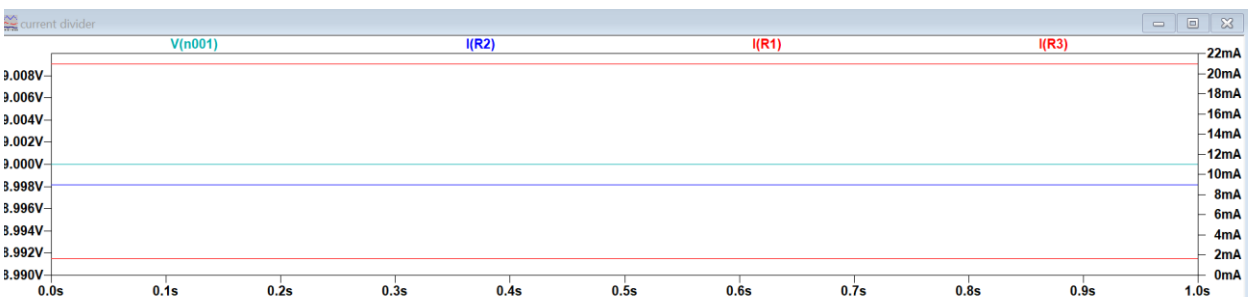
Colby Alley

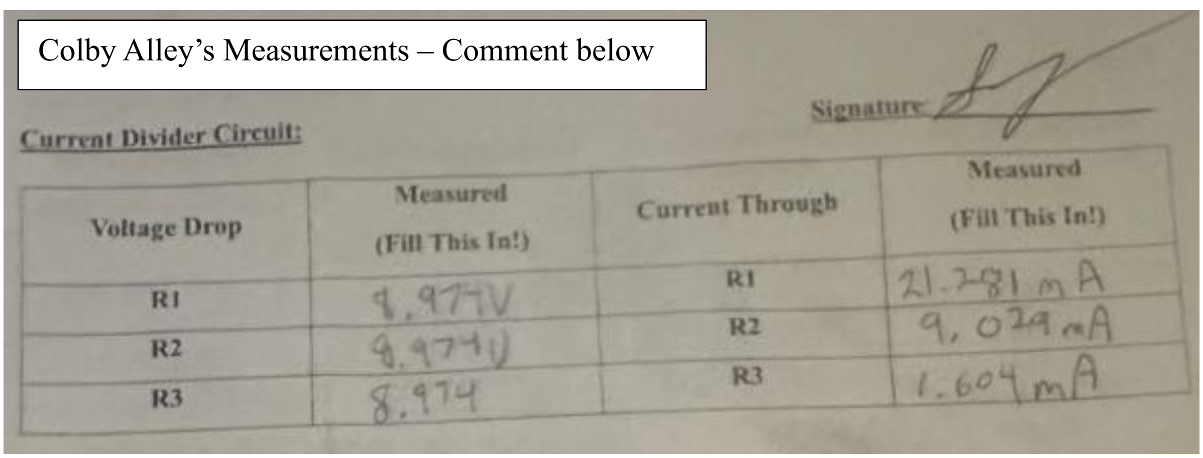
Current Divider Circuit



LTSpice simulation:






Colby Alley's Measurements – Comment below

Signature

Current Divider Circuit:

Voltage Drop	Measured (Fill This In!)	Current Through	Measured (Fill This In!)
R1	8.974V	R1	21.281 mA
R2	8.974V	R2	9,029 mA
R3	8.974	R3	1.604 mA

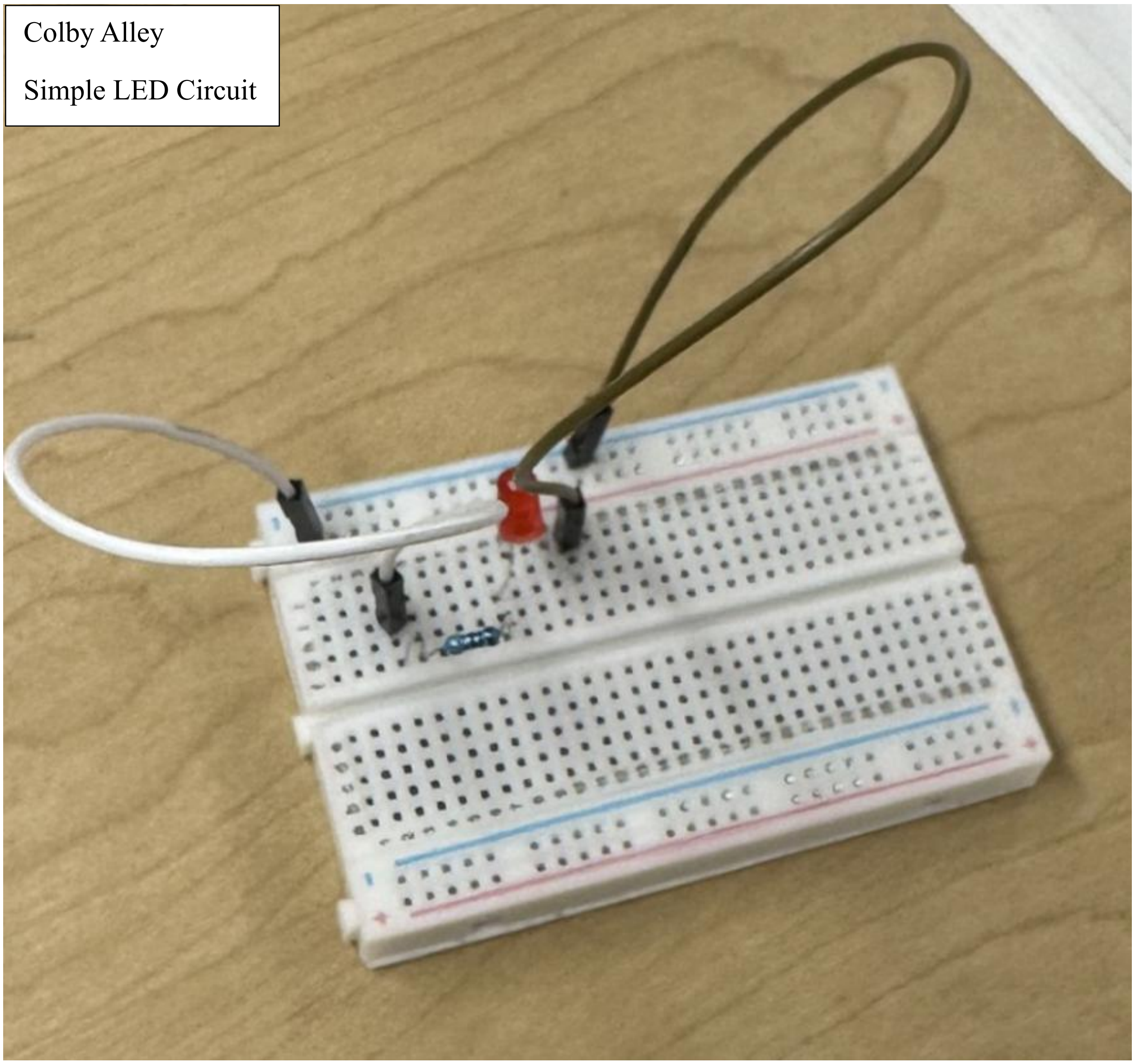
Voltage Drop	Measured	Current Through	Measured
R1	8.974 V	R1	21.281 mA
R2	8.974 V	R2	9.029 mA
R3	8.974 V	R3	1.604 mA

What are my thoughts:

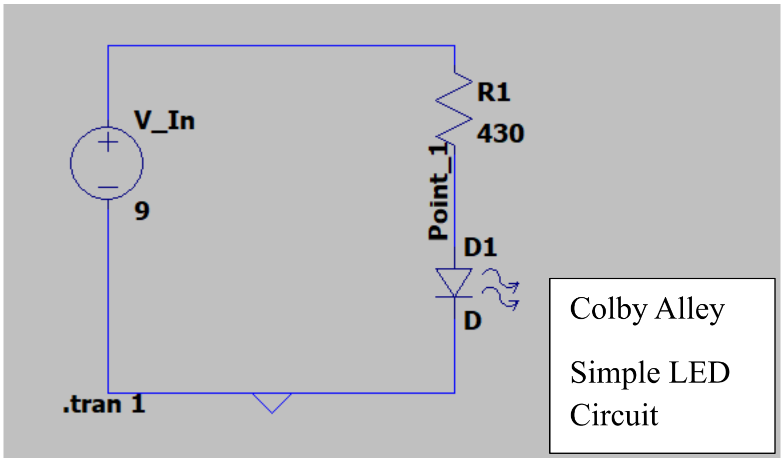
Important to note that the voltage stays the same across all resistors, but the amperage decreases as the ohm resistor value increase! Not sure exactly the reason behind this, however, I feel I will learn soon enough (I would assume as the ohm in the resistor increased, potentially the amperage would as well).

Part 4: Simple LED Circuit

Pictures:

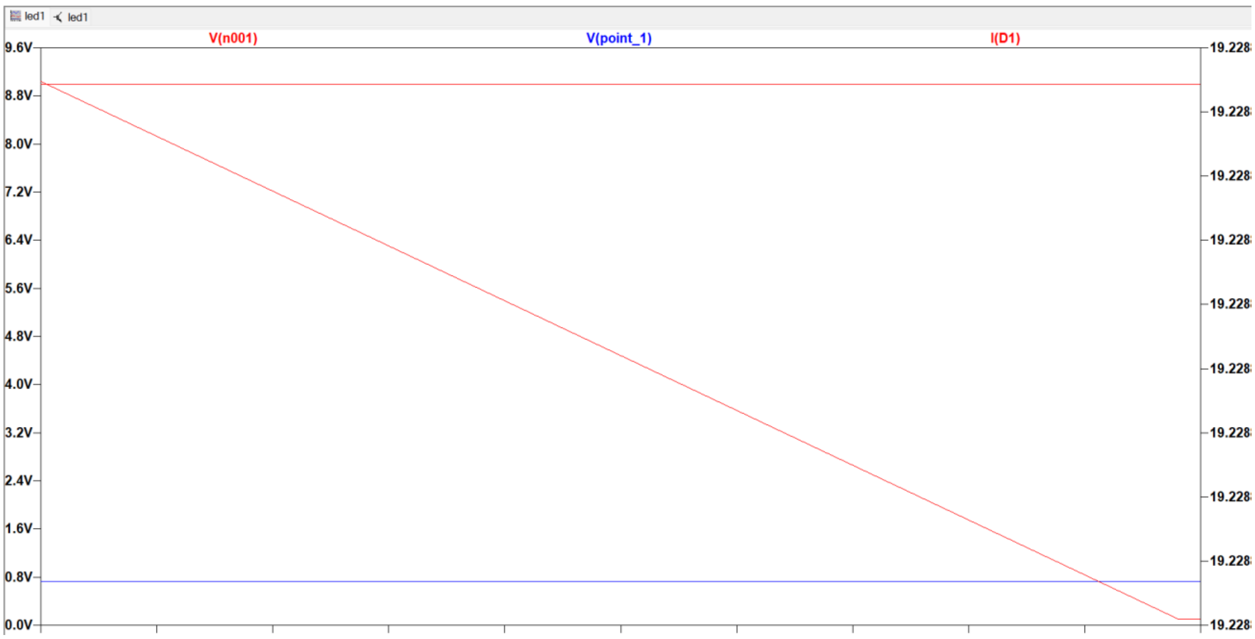


LTSpice simulation:

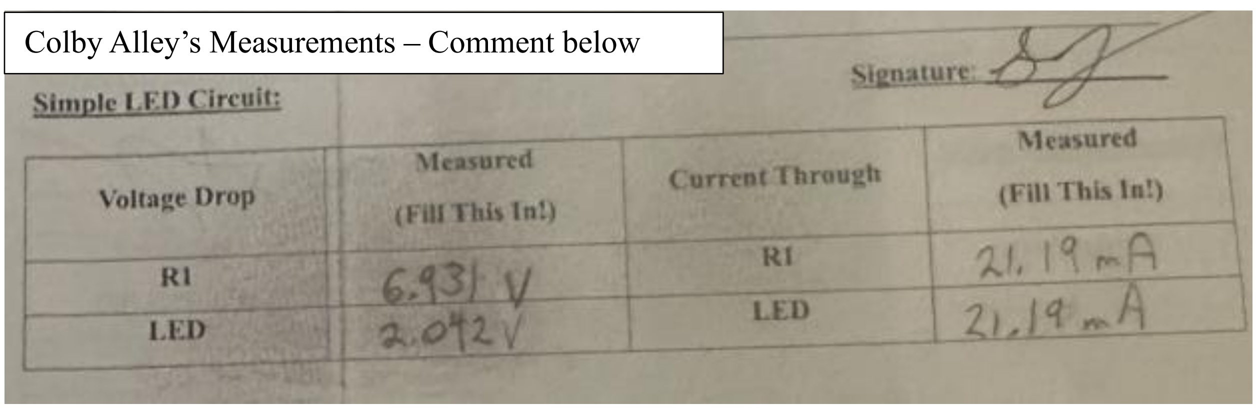


Colby Alley

Simple LED Circuit



Colby Alley's Measurements – Comment below



Simple LED Circuit:

Signature:

Voltage Drop	Measured (Fill This In!)	Current Through	Measured (Fill This In!)
R1	6.931 V	R1	21.19 mA
LED	2.042 V	LED	21.19 mA

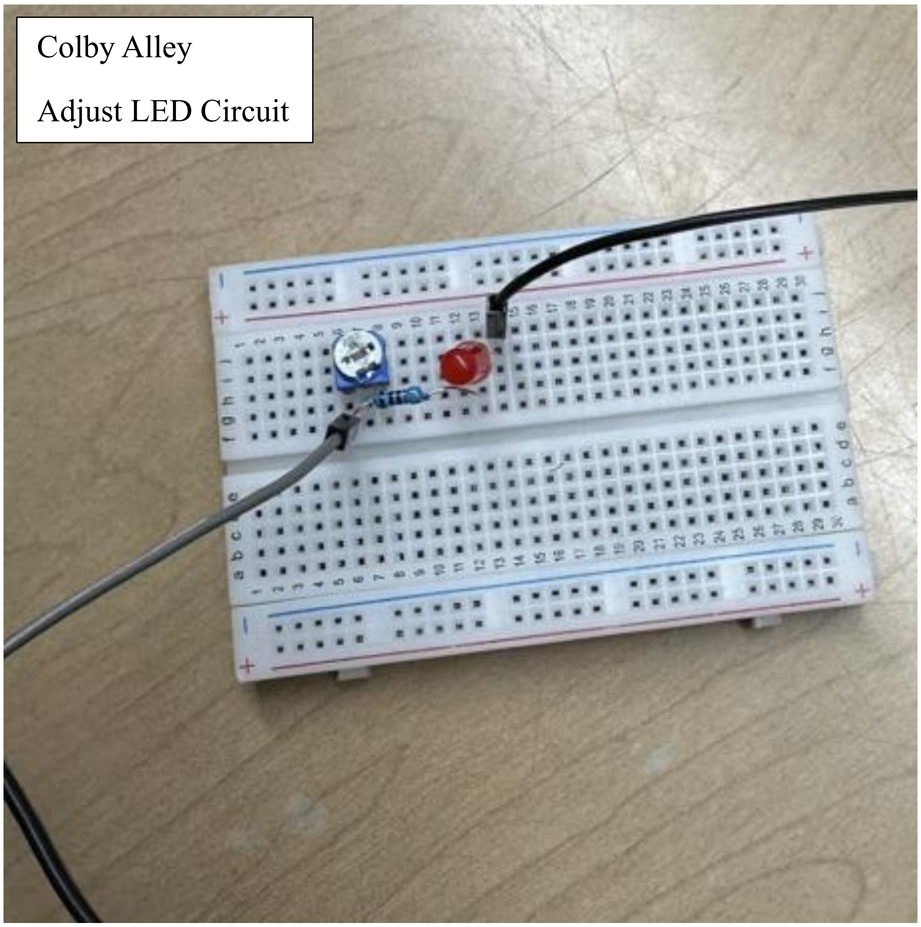
Voltage Drop	Measured	Current Through	Measured
R1	6.931 V	R1	21.19 mA
LED	2.042 V	LED	21.19 mA

What are my thoughts:

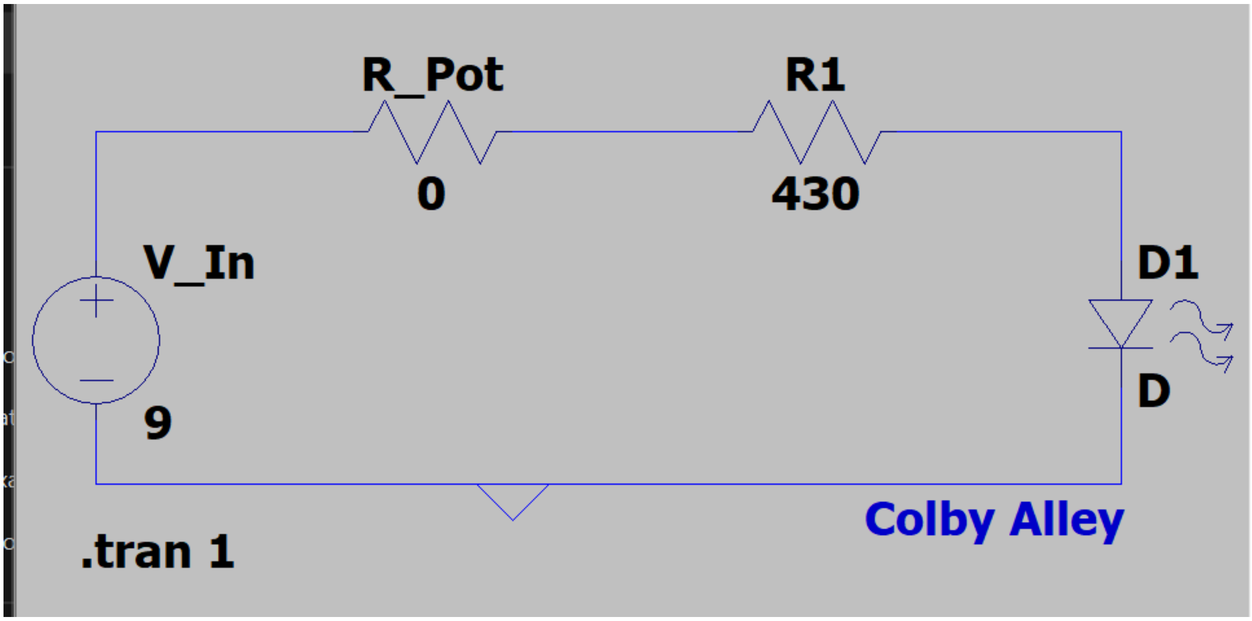
Good to note voltage equals the total voltage, roughly (9V). Important to see that both the resistor and LED has the same amount of amperage going through them. LTSpice is important here as it shows the downward slope when measuring the amperage as the LED potentially burns out.

Part 5: Adjustable LED Circuit

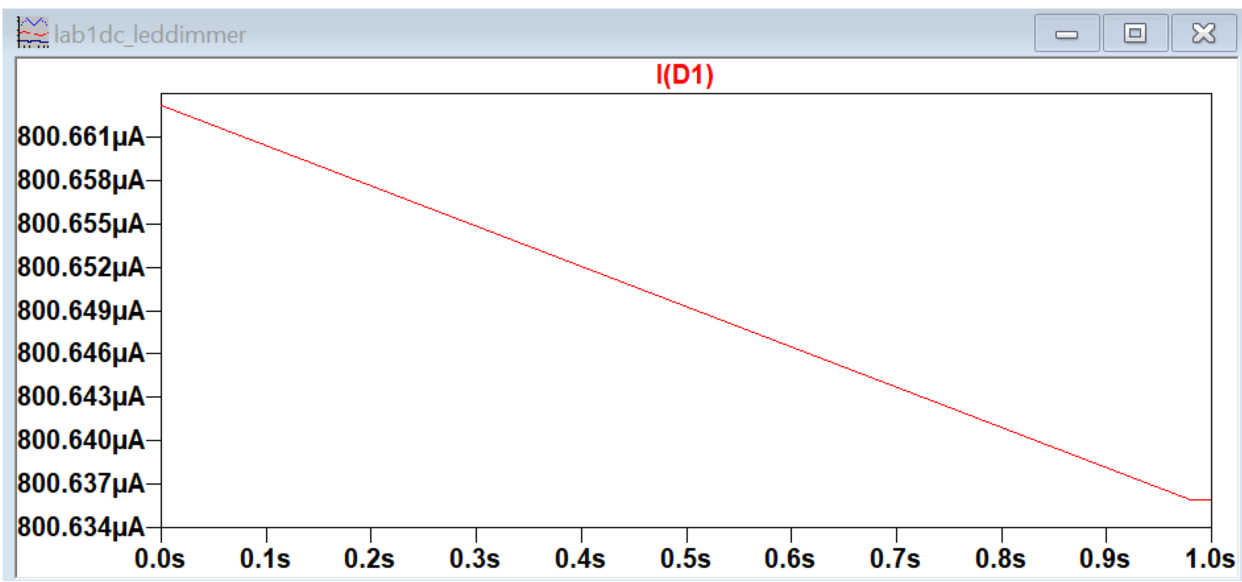
Pictures:



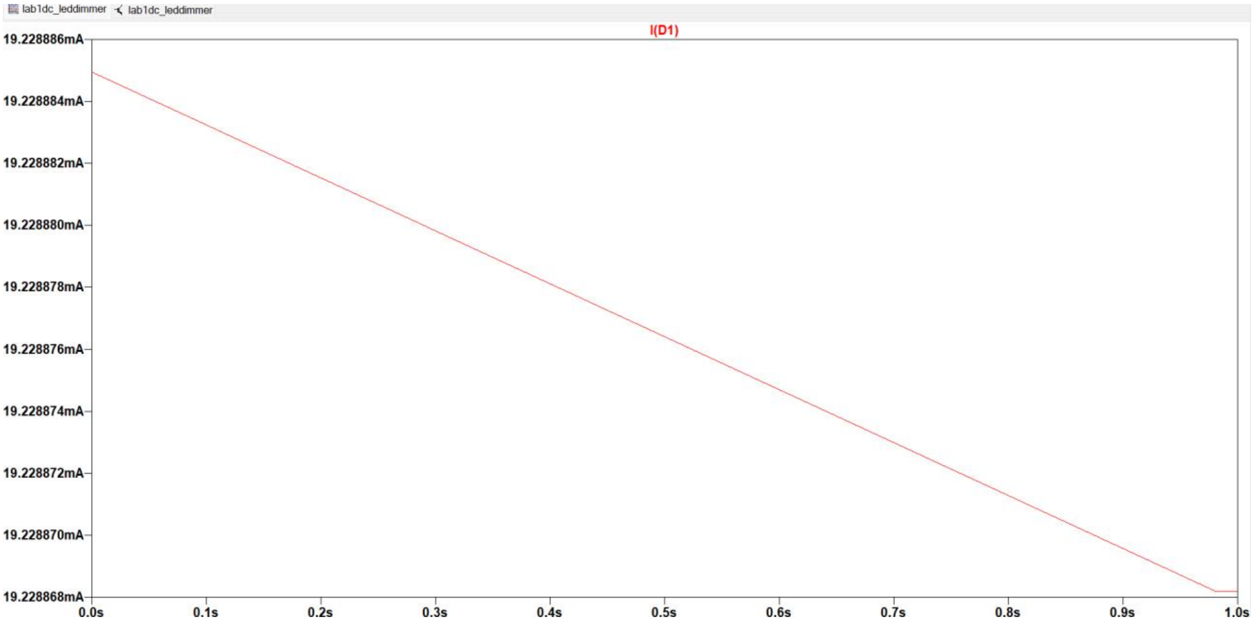
LTSpice simulation:



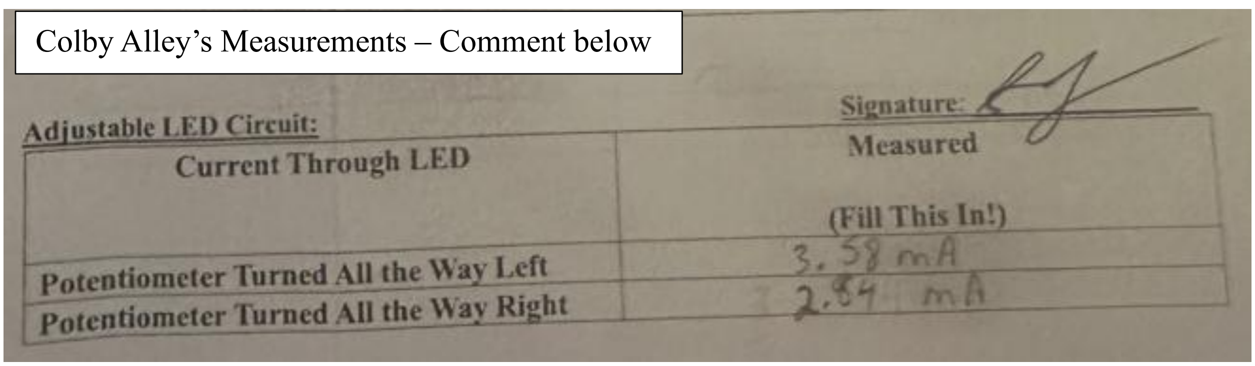
Value when potentiometer turned to the right:



Value when potentiometer turned to the left:



Colby Alley's Measurements – Comment below



Adjustable LED Circuit:

Signature:

Current Through LED	Measured (Fill This In!)
Potentiometer Turned All the Way Left	3.58 mA
Potentiometer Turned All the Way Right	2.84 mA

Current through LED	Measured
Potentiometer Turned All the Way Left	3.58 mA
Potentiometer Turned All the Way Right	2.84 mA

What are my thoughts:

It is important to see how turning the potentiometer left, the current increases, and how turning the potentiometer right, the current decreases. Using the real-life lab experiment with this part of the lab helps me understand how LTSpice's values are manipulated. I tested the potentiometer on LTSpice a couple different times to see how the current is measured with different values, and it helped me understand how to use LTSpice better.

Lab 2 Conclusion

Although it was a simple and straightforward lab, it helped me a lot visualize how breadboard works as well as how voltage, resistors, and current is measured with a multimeter. Also, it helped me see how current decreases or increases depending certain situations, like moving a potentiometer counterclockwise or clockwise. I would say I am still curious about how the ohms of certain resistors will change how values will be read on a multimeter. Overall, it was an awesome learning experience, and I am excited for future labs.