Christian Garcia

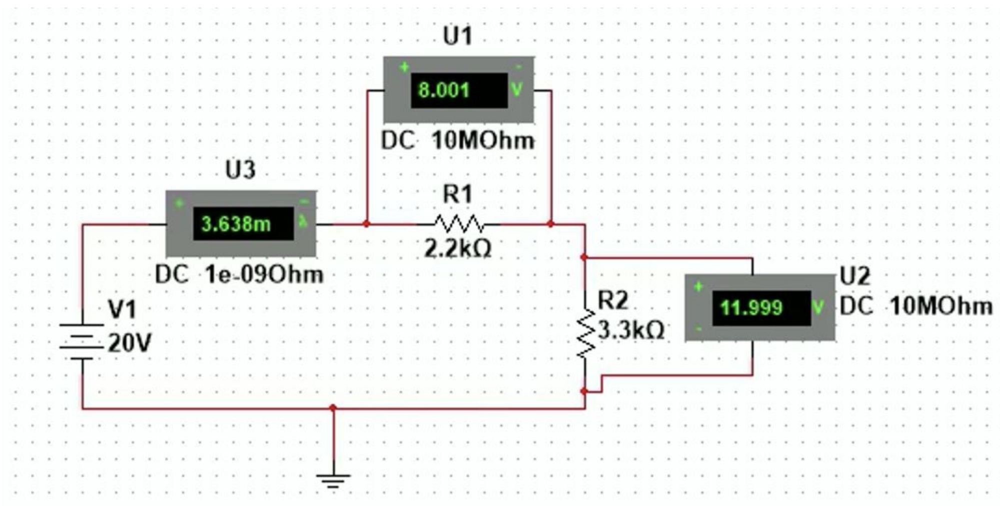
ELEN 50 Lab

7 October 2020

Wednesday 2:15

Lab 2 Report: Circuits with Series and Parallel Resistors

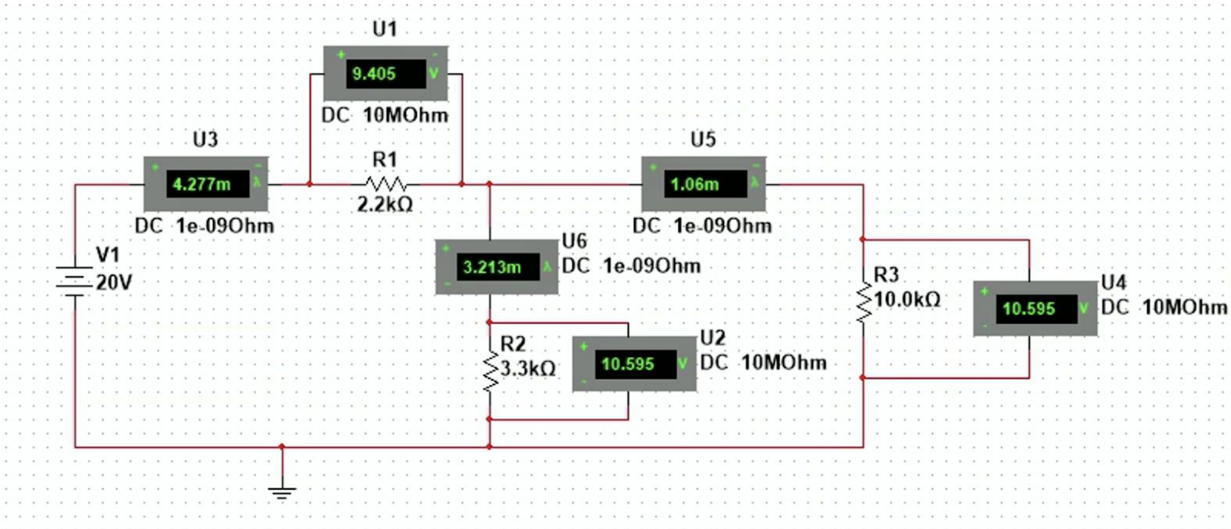
Part 1:



	Vs	V1	V2	R1	R2	I1
Calculated	-	8V	12V	-	-	3.64mA
Measured	20V	8.001v	11.999V	2.2kΩ	3.3kΩ	3.638mA
% Difference	-	0.000%	-0.000%	-	-	-0.000%

4. V1/V2 = 0.6668 & R1/R2 = 0.667

The ratios between the voltages and the resistors are basically equal to each other, which is what we should expect to see.



Vs = 20V ; R1 = 2.2 kΩ ; R2 = 3.3 kΩ ; R3 = 10 kΩ

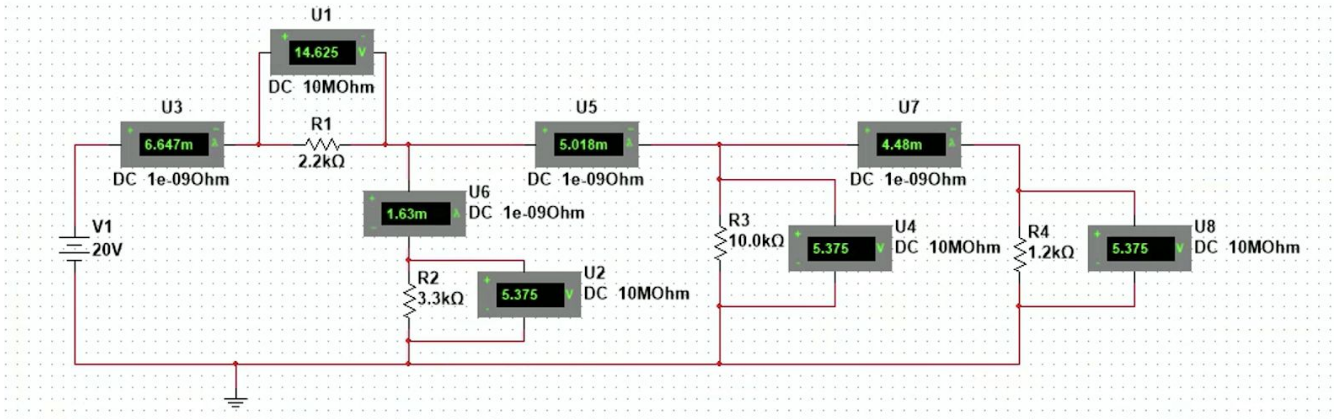
	V1	V2	V3	I1	I2	I3
Calculated	9.39V	10.61V	10.61V	4.27mA	3.22mA	1.05mA
Measured	9.405V	10.595V	10.595V	4.277mA	3.213mA	1.06mA
% Difference	0.002%	-0.001%	-0.001%	0.002%	-0.002%	0.0095%

7. Req = (R2 * R3)/(R2 + R3) -> Req = (3.3 * 10)/(3.3 + 10) = 2.48kΩ

V2 and I2 should both be less because of the extra resistor. There is also another path for the electric current to flow through, which lessens the amount of electricity passing through one channel. Hence when the voltage and current values both decrease.

8. I2/I3 = 3.03 & R2/R3 = 0.33

Current and Resistance are inversely related. If we look at Ohm's Law V = IR and If we solve for I, then I = V/R. Using this we see that if our resistance were to increase our current would decrease and vice versa. So they are inversely related.

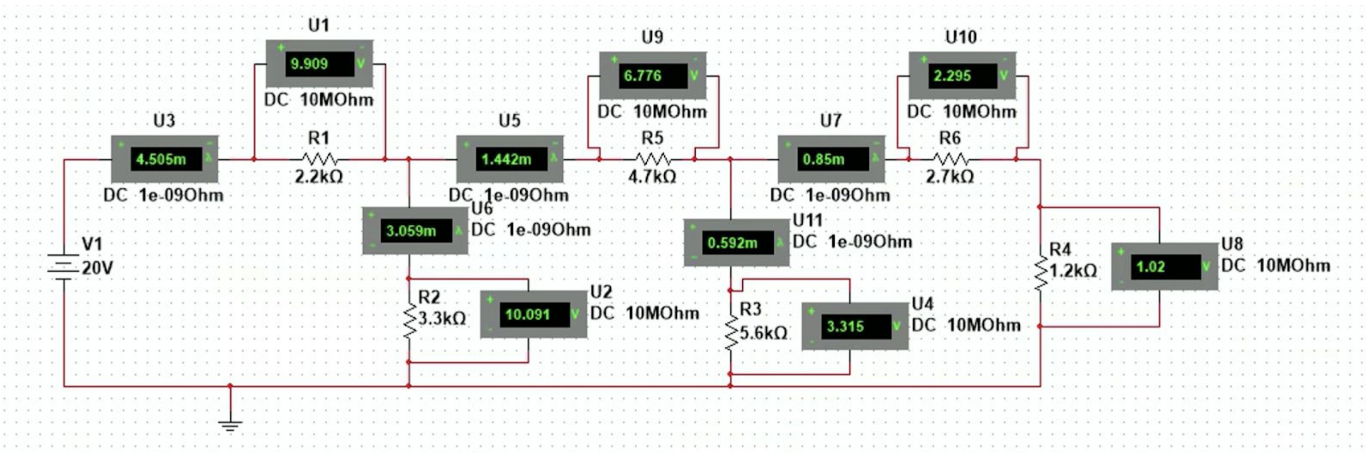


Vs = 20V ; R1 = 2.2 kΩ ; R2 = 3.3 kΩ ; R3 = 10 kΩ ; R4 = 1.2 kΩ

	V1	V2	V3	V4	I1	I2	I3	I4
Calculated	14.624V	5.376V	5.376V	5.376V	6.65mA	1.63mA	5.018mA	4.48mA
Measured	14.625V	5.375V	5.375V	5.375V	6.647mA	1.63mA	5.018mA	4.48mA
% Difference	0.000%	-0.000%	-0.000%	-0.000%	-0.000%	0%	0%	0%

10. Req = ((1 / 3.3) + (1 / 10) + (1 / 1.2))^-1 = 0.809 kΩ

They current I1, is inversely divided between the resistance and their resistance values.



Vs = 20V ; R1 = 2.2kΩ ; R2 = 3.3kΩ ; R3 = 4.7kΩ ; R4 = 5.6kΩ ; R5 = 2.7kΩ ; R6 = 1.2kΩ

	V1	V2	V3	V4	V5	V6
Calculated	9.9V	10.1V	6.768V	3.332V	2.2815V	1.0505V
Measured	9.909V	10.091V	6.776V	3.315V	2.295V	1.02V
% Difference	0.000%	-0.000%	0.001%	-0.005%	0.006%	-0.029%

	I1	I2	I3	I4	I5
Calculated	4.5mA	3.06mA	1.44mA	0.595mA	0.845mA
Measured	4.505mA	3.059mA	1.442mA	0.592mA	0.85mA
% Difference	0.000%	-0.000%	0.000%	-0.000%	0.006%

3. Node 1: -4.505 + 3.059 + 1.442 = -0.004 // Here the discrepancy is small enough where it doesn't affect anything.

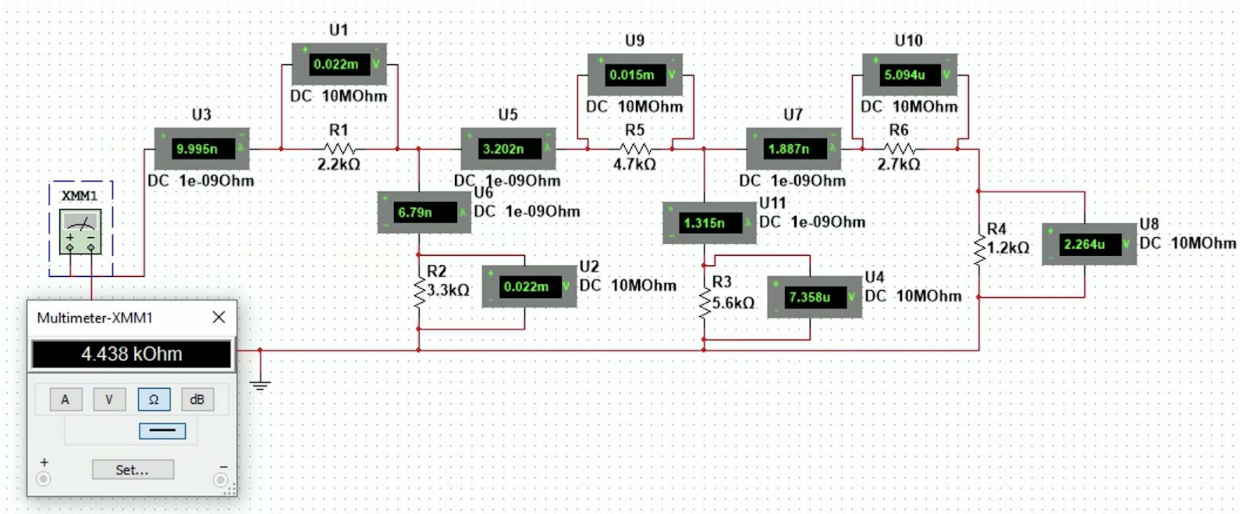
Node 2: -1.442 + 0.592 + 0.85 = 0

4. Loop 1: 9.909 + 10.091 - 20 = 0

Loop 2: 6.776 + 3.315 - 10.091 = 0

Loop 3: 2.295 + 1.02 - 3.315 = 0

5. 4.438 (Lab) = 4.44 (PreLab)



6. V = IR ; R = V/I ; R = 20/4.505 ; R = 4.439kΩ

These values are almost identical to each other.

7. If R6 were an unknown resistor value you could find it using Kirchoff's Laws. We would figure out the voltage and current running through that end of the circuit and then use Ohm's Laws and those values to figure out R6.