ECEN 3714--------Network Analysis

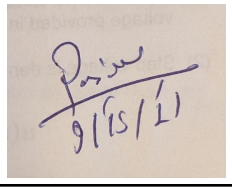
Cover Sheet for Lab 3 to 10

Fall 2021

Lab #_____3_____

Topic___RC Circuit_____

Final Report (Pre-lab + Post-lab)

Name of the group members	
Name (print): Easton Hendrickson	Name (print): Roger Bennett
Signature:	Signature: Roger Bennett
TA Signature: 	

1. Introduction:

1.1. In this lab I was tasked with the assignments of finding the time-constant of a first-order RC Circuit depicted later in this report. The pre lab was done mostly in PSpice. While in the lab we used the bread board in combination with the oscilloscope and function generator. Our time in the lab did not take long as it was two simple RC Circuits and after watching the lecture videos for the lab it allowed it to run smoothly.

2. Pre-Lab Work:

2.1. $V_{out}=V \cdot e^{-t/\tau}$

Time constant equation for Circuit 1:$\tau = R \cdot C$

Time constant equation for Circuit 2:$\tau = R \cdot C$

2.2.

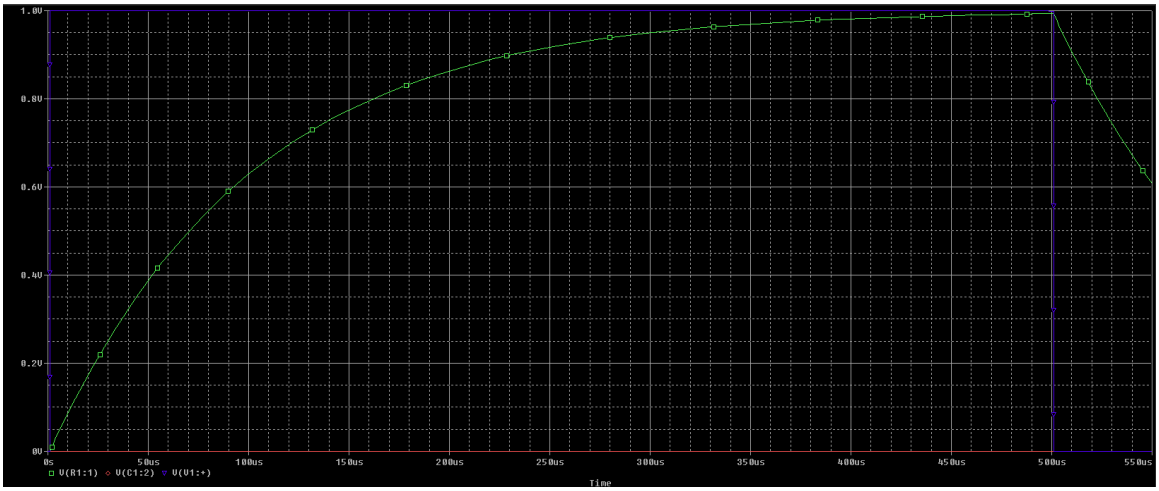


Figure 1: Graph of step voltage of u(t)

2.3. I believe that if the resistance is doubled and capacitance is halved, then no change will occur to the time constant, as the doubled resistance and halved capacitance will cancel each other out.

2.4.

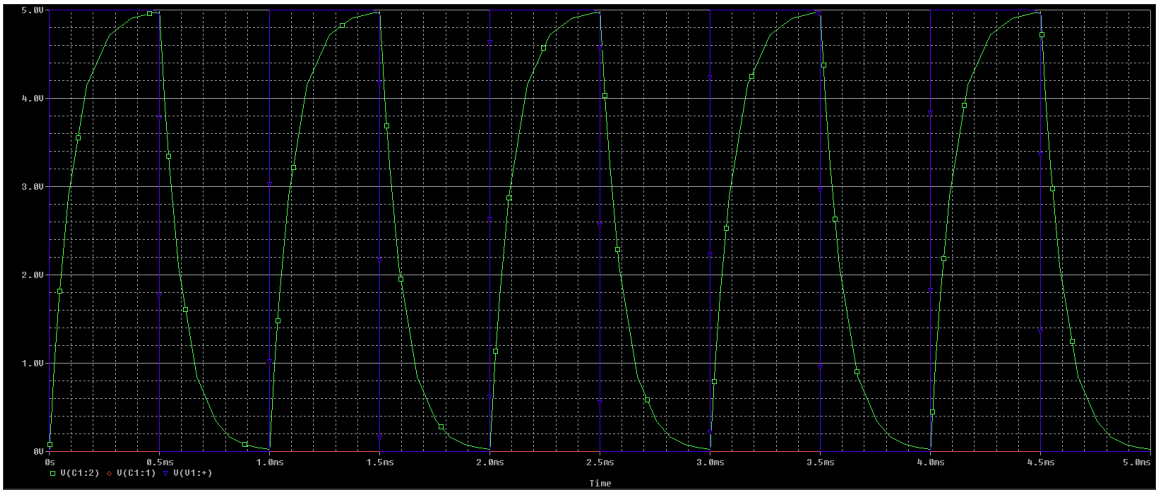


Figure 2: Step diagram of doubled resistance and halved capacitance for Circuit 1

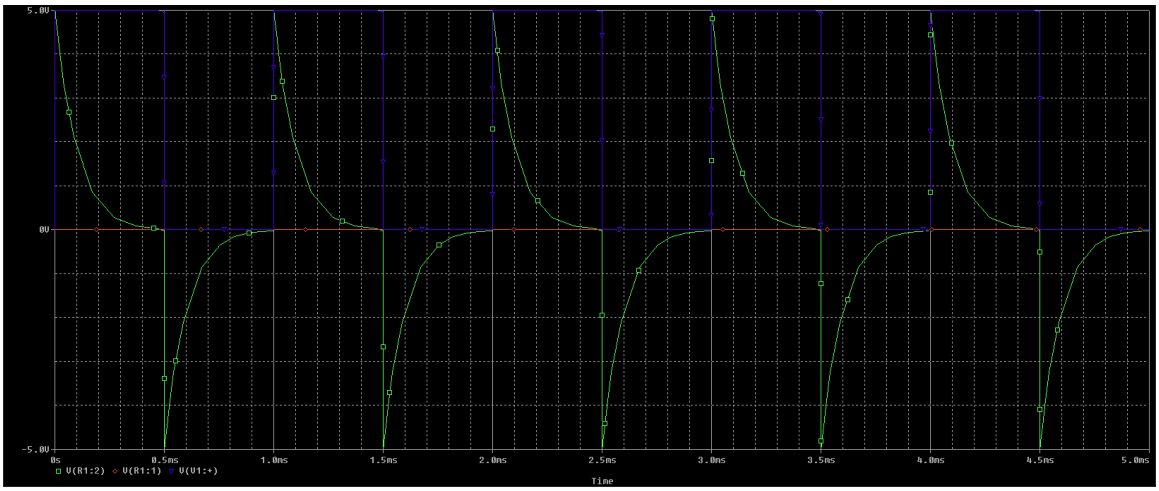


Figure 3: Step diagram of doubled resistance and halved capacitance for Circuit 2

2.5. I believe that if the resistance is doubled with NO change to capacitance, then the RC time constant will increase with it.

2.6.

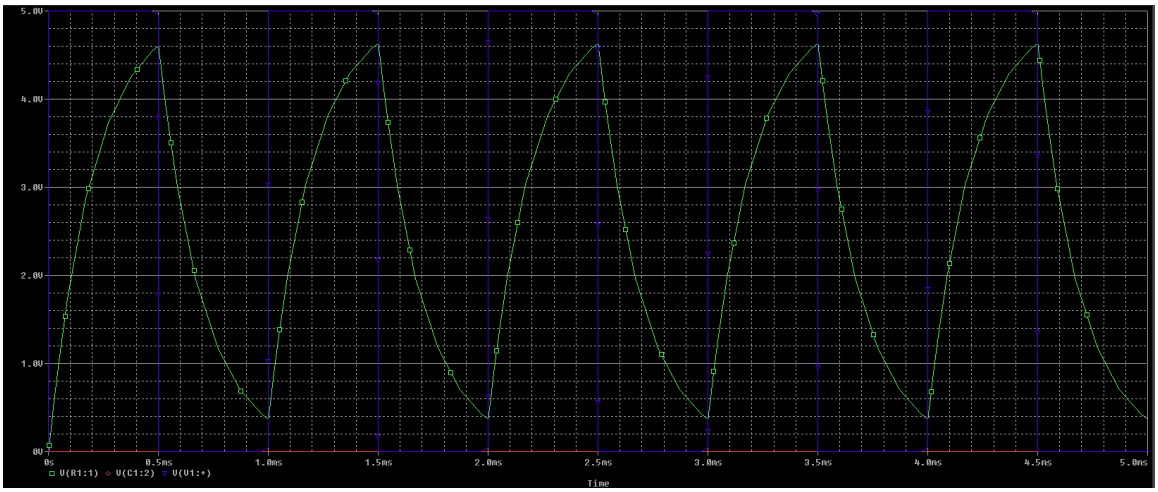


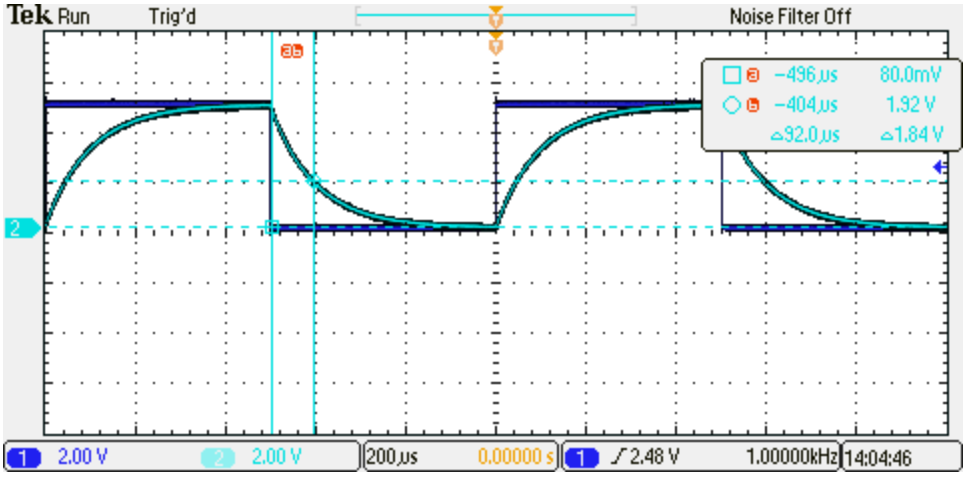
Figure 4: Step diagram of doubled resistance for Circuit 1

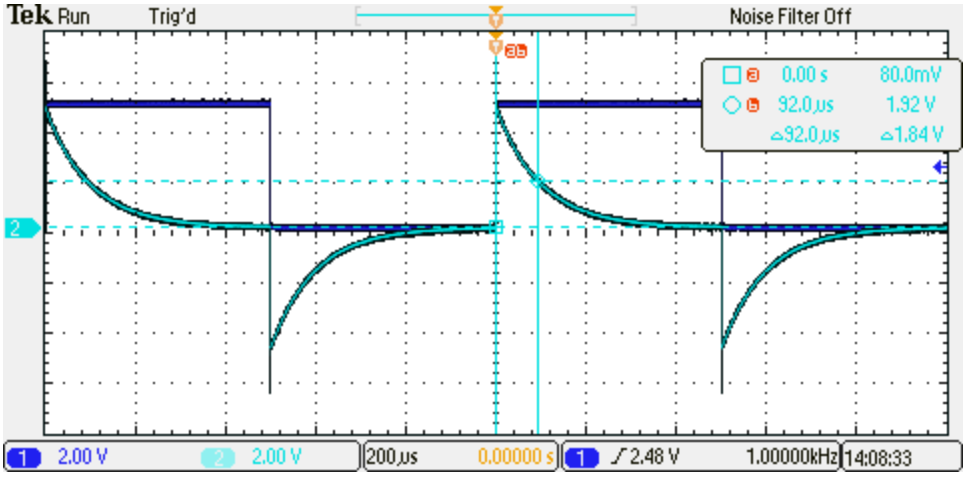
3. Lab Assignment:

3.1.

	Circuit (i)	Circuit (ii)
Time Constant - Estimated	100µs	100µs
Time Constant - Measured	92µs	92µs
Percentage of Error	8%	8%

$$Percent\ Error\ =\ \left|\frac{92-100\ (microseconds)}{100\ (microseconds)}\right| \times\ 100\%\ =\ 8\%$$

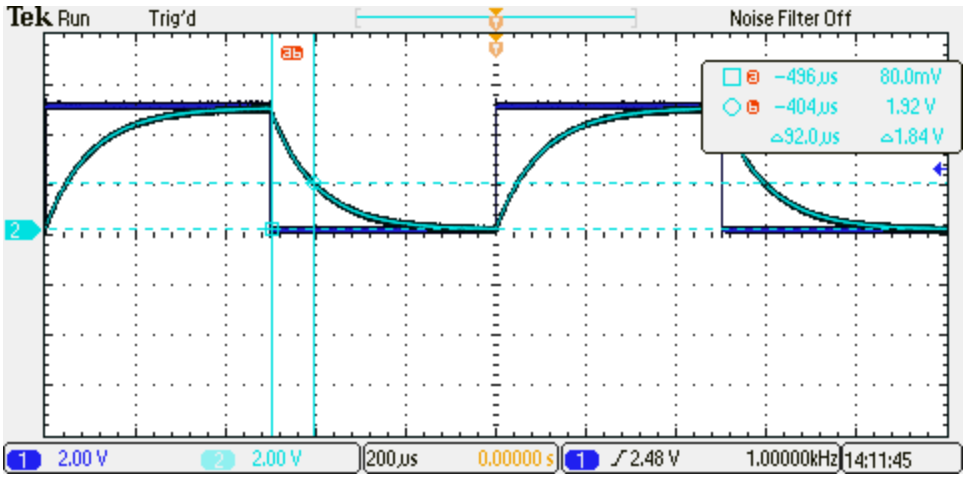




3.2.

	Circuit (i)
Time Constant - Estimated	100µs
Time Constant - Measured	92µs
Percentage Error	8%

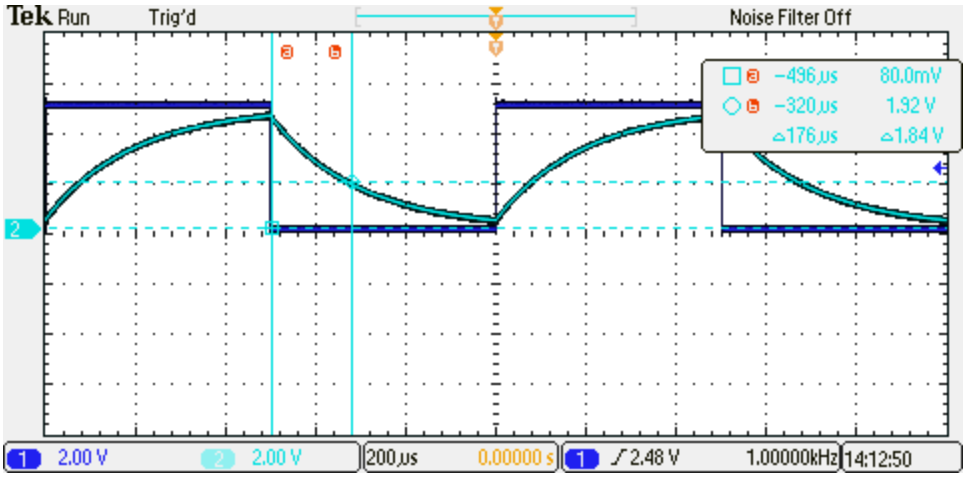
$$Percent\ Error\ =\ \left|\frac{92-100\ (microseconds)}{100\ (microseconds)}\right| \times\ 100\%\ =\ 8\%$$



3.3.

	Circuit (i)
Time Constant - Estimated	200µs
Time Constant - Measured	176µs
Percentage Error	12%

$$Percent\ Error\ =\ \left|\frac{176-200\ (microseconds)}{200\ (microseconds)}\right| \times\ 100\%\ =\ 8\%$$



4. Discussion:

4.1. In class we learned about the RC time constant and the relationship between resistance and capacitance. We believe that this lab's purpose was for us to learn how to emulate what we learned in class in a practical setting. We were actually able to see how the changes made to the resistance and capacitance affected the time constant we measured.

4.2. The voltage changing shouldn't affect the time constant as the time constant itself is the amount of time it takes for the capacitor to charge up a specific amount.

4.3. We could've increased the zoom on the oscilloscope to get an ultra accurate reading for our time constant, but we wanted to get a good snapshot of our graphs.

4.4. We feel that our experimental values were accurate to the theoretical value of the time constant. We achieved a little percent error for each.

5. References:

5.1. Canvas Lab Videos

5.2. PSpice