Part 1: 100KΩ resistor and 10 μF capacitor, 5V DC

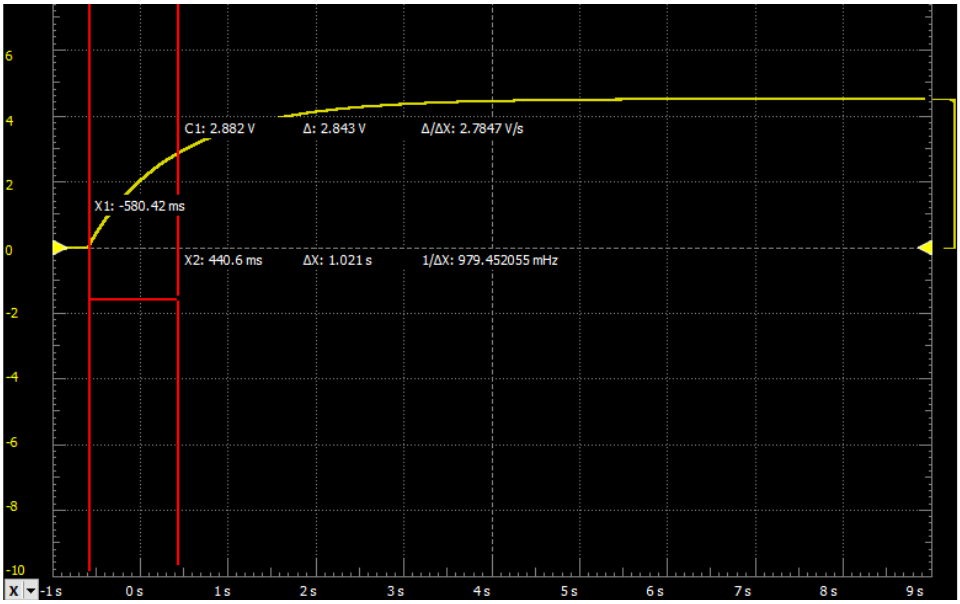
Fully charged voltage: $V(t=\infty) = 4.49\ V$

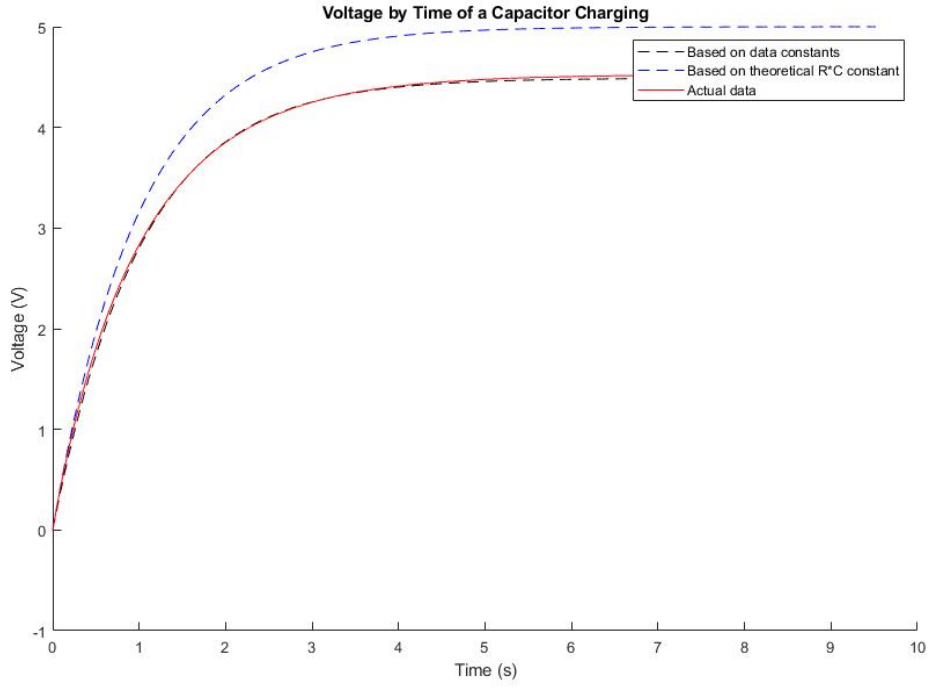
General form of equation: $V(t) = V(\infty) * (1 - e^{-t/\tau}) = 4.49 * (1 - e^{-t/\tau})$

Solving for Voltage: $V(\tau) = V(\infty) * (1 - e^{-1}) = 4.49 * (1 - 1/e) = 2.838\ V$

According to the graph, when $\Delta V = 2.838\ V$, $\Delta X = 1.021\ seconds$

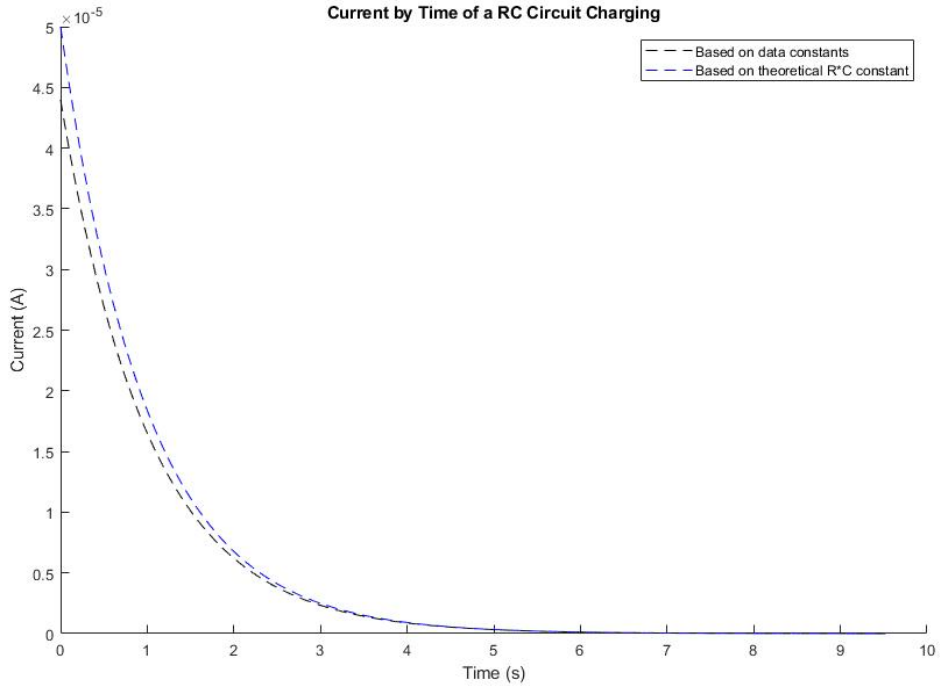
Final output equation: $V(t) = 4.49 * (1 - e^{-t/1.021})$





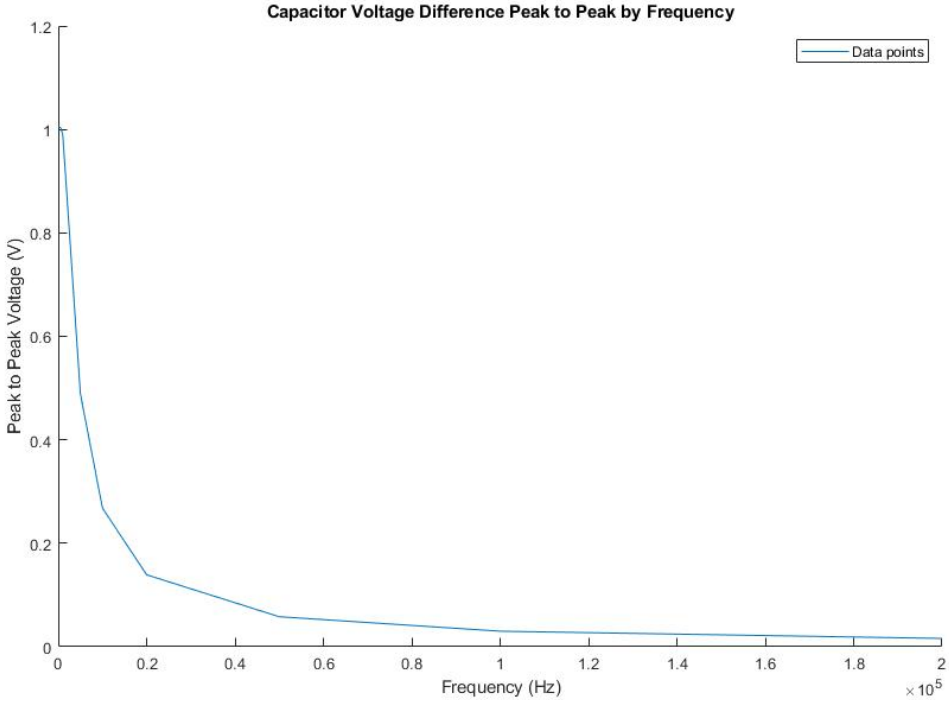
$$I_{capacitor}(t) = C * V(t)' = 10^{-5} * (4.49 * (1 - e^{-t/1.021}))' = 10^{-5} * 4.39765 * e^{-0.979432*t} = I_{resistor}(t)$$

Graphing the current through this series circuit:



Part 2: 1KΩ resistor and 0.1 μF capacitor, Square Waves 500mV offset, 500mV amplitude

Frequency (Hz)	Peak to peak Voltage (V)
100	1.0045
500	1.0038
1k	0.99107
2k	0.867
5k	0.489
10k	0.268
20k	0.139
50k	0.058
100k	0.03
200k	0.016


Capacitor Voltage Difference Peak to Peak by Frequency
Data points
Peak to Peak Voltage (V)
Frequency (Hz)
$\times 10^5$
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2