ECE 376 - Homework #7

Data Collection (population A)

1) Measure one of the following with at least two data sets and 20+ data points per run:
- The voltage across a capacitor as it discharges
- The temperature of a cup (or can) of hot water as it cools off
- The temperature of a can of cold water as it warms up
- Other

Plot the resulting data vs. time.

2) Determine the time constant from your data using least-squares

$$V = ae^{-bt} \qquad\qquad T = ae^{-bt} + T_{amb}$$

$$\ln(V) = \ln(a) - bt \qquad\qquad \ln(T - T_{amb}) = \ln(a) - bt$$

3) Use a student t-test to determine the 90% confidnence interval for your time constant (b).

Data Collection (population B)

Change something in your experiment
- Reverse the polarity of the capacitor
- Use a different type of capacitor (ceramic, electrolytic, etc)
- Add a lid to your cup of water
- Add a koozie to your cup of cold water

4) Take a second set of data with the change.
- Plot the resulting data vs. time

5) Determine the time constant from your data using least-squares

6) Use a student t test to determine the 90% confidnence interval for your time constant (b).

Comparison of Means Test (A vs. B)

7) Do a comparison of means test to determine the probability that
- The next measurement from A will have a higher value than the next meaurement from B
- Population A has a higher mean than population B