Lab 3 Grading Standard:

- *In grading, do not explicitly assign points to the various sections. Rather, take points off for incorrect, incomplete or missing items.*
- *When you take point off, be sure to write a short comment as to why the points were lost.*
- *Example: (-1) What is the measured value of the component?*
  (-3) What is the mathematical formula that you are
  - *plotting on top of your data?*
- *4) All plots need to have the axes labeled and units indicated.*
- *5) This lab should allow them to compare the experimental and theoretical characteristic times for the circuits. They need to do that.*

General Notes:

- The axis of all plots must be labeled. This should include the quantity, the units and numerical values.
- The boxed questions should be answered in the lab book.
- Procedures must have a circuit diagram.
- Measured values of components used should be recorded in the lab book.

Failure to measure a component value when possible (max -1 per occurrence)
Missing units on components, plot axes, tables … (-1 per occurrence).
Missing plot (-4 per occurrence).
Missing axes labels on plots (-1 per label).
Missing column labels on tables (-1 per label).
No fit to linear curves (-2 per occurrence).
No fit values with units (-2 per occurrence).
No comparison of fit values with expectations when possible (-2 per occurrence).
Missing theoretical calculations when expected (-3 per occurrence).
Failure to answer questions (-2 per question, maximum of -10)

Pre-lab Signature: 10

Purpose/Introduction 5

There should be a two to five line description of what they are going to do in this lab. This is all or nothing for five points.

3.2.1: Time domain of RC:

Procedure: 10

There should be a several line procedure that shows the circuit, indicates where they are going to measure voltages, what the measured values of the components are, and how they collect voltage using the scope. It needs to be clear enough to follow and should be thought out. The procedure also needs to describe how they collect the signals for the large capacitor (rubbing wires) and how they use a square wave for the small capacitor.

Data: 15

Should have raw plots of the voltage across the resistor and voltage across the capacitor for both RC circuits. They should comment on this data what can be used for later analysis.

Analysis: 20

They need to show the math for linearizing both the voltage across the capacitor and that across the resistor. For the voltages across the capacitor, they will need to choose a value for the final voltage, they need to say what it is. For the fast transient, they need to comment on the fact that the square wave does not rise fast enough to be a clean step function and what they did about it. They might note that the capacitance of the scope probe, especially using the x1 mode is large compared to the capacitance that they are using and probably impacts the results that they get. Linearized plots need to be made, slopes of lines fitted and a comparison made with the expected time constants from their measured values of R and C.

3.2.1: Time domain of RL:

Procedure: 5

The procedure should include circuit diagrams, measured values of components and a description of what they are going to do.

Data: Measurements of the voltage across the resistor . 10

Analysis: 10

Linearizing this circuit is a bit tricky as there is resistance in the inductor. They need to include the math showing what they are doing, and then show the linearized plot. They should then get the slope of the line and compare it with their expected slope from R and L.

Questions 10

Conclusion/Summary 5