Design Your Own LAB 5 Experiment

You need to decide what you will do in lab on October 24. Your pre-lab is to design your lab to investigate first order circuits. If you want to run ideas by me before lab, feel free to do so. You may work with your lab partner, and hand in one joint pre-lab this week.

- Find a concept from Chapter 7 that you want to investigate more thoroughly, and that can be investigated in our lab with our equipment and available circuit elements.
  - Your objective(s) for the lab can include: exploring new concepts and theories, reinforcing concepts and theories from earlier chapters, investigating differences between idealized circuit behavior on paper and actual circuit behavior, exploring analogies between circuit theory and other areas of engineering science, and other objectives you find compelling.
- Think of what type of circuit to build and what to measure in the circuit, in order to investigate, or confirm, or explore your concept-of-interest.
  - It can be a short experiment, but just needs to come from you rather than from me.
  - Your circuit(s) should contain at least one resistor and one capacitor. (we do not have a good selection of inductors, so stick with an RC circuit for this lab.)
  - Investigation of the charging and discharging behavior of an RC circuit is a common experiment – do not think of anything too complex or you may run out of time.
    - You need to involve the concept of ‘time constant’ in your experiment(s).
  - You MUST use a USB drive to capture and present any results from the oscilloscope – do not use photos taken with your phone or other camera.
- The passage of time will be an element with these circuits, as these are ‘dynamic.’ This is to say, you might want to think about (and measure) how different circuit variables (voltage and/or current) change over time.
- Even though we have many capacitors in the lab, you may still need to be flexible with the values you use once you are actually in lab and see what is available.
- Suggestion: Use input voltage of at least 1V_{pp} (not 100mV_{pp}) to be able to record good data for the circuit behavior.
For Your Pre-Lab –

- Title of your lab experiment
- Names of partners in developing the lab idea
  - You may work together with as many classmates as you desire to design the lab – include all these names on this lab plan that you submit
  - Once in the lab, you will work only in your normal groups of two
  - Hand in one pre-lab for each group of two lab partners (not one pre-lab from everyone you spoke/worked with)
- Objective of the lab
- Your circuit diagram(s) of what you plan to build and analyze.
- What measurements you will make and why
- Expected findings

- DO NOT submit to me the lab that your classmates may have used with Profs. Dorsey or Voss.
  - I have that lab as well and using someone else's work as your own is plagiarism.
  - You can submit something with essentially the same goals and basic circuits, but it still needs to be your own work.

For the Lab Memo after the lab is done

- Make sure your lab memo will communicate to any reader what you did and found.
  - Keep the text to essentially one page, but you can go over one page with the addition of circuit diagrams, graphs, equations, etc.
- Report your results with words, equations, numbers... and graphs
  - You MUST include plots with this lab memo, including graphs from data you record by hand and saved .png figures from the oscilloscope (no pictures from an iPhone or other camera).
  - With every figure (graph, plot...) you must explain to the reader why the figure is there, what is interesting about it, what it explains, what it shows, etc.
  - If you do not point the reader (me) to your figure, the reader might not look at it.
  - You need to do the intellectual work of explaining what is interesting or important about your figure, and not leave that to the reader to figure out on her own.