Report 1: Comments (Expected technical content and flow of the report, common mistakes)

Abstract (Should describe apparatus, procedure and results. Describing what you learned is the most important part of the abstract.)

1. Include specific details of the apparatus procedure (RC-circuit, instruments used, step vs. sinusoidal inputs, frequency range tested, etc.)
2. Do not include too much procedure, be more concise.
3. Include more results.
4. Results should be specific and quantitative.
   - discuss trends observed for step, amplitude and phase response
   - describe agreement with theory (e.g. with percentage difference)
5. Don’t refer to tables or figures in the abstract. It should stand alone.

Introduction

1. Your introduction does not have to be one page long. It should say why you are interested in studying first-order systems and why the features that you are studying (step and frequency response) are important characteristics of a first-order system. Also, make sure that your introduction contains information that is correct.
2. Don’t include details of your apparatus and procedure in your introduction. This should be included in the apparatus and procedure section. Also, do not duplicate text material in different sections.

Theory

1. Define symbols and use them consistently across your schematics, equations, text and figures.
2. Reference equations.
3. Include figures (e.g. RC circuit schematic) to illustrate theory (your own schematics and plots).
4. Do not show experimental data in the theory section (plots shown should be purely theoretical, if you show them).
5. Don’t define symbols more than once.
6. Write equations as \( a=bc \), not \( a=b\times c \). The \( \times \) symbol is used in programming, not mathematics. Write \( 5\times10^4 \), not \( 5e^4 \). Use equation editor for your equations.

Apparatus and Procedure

1. Include figures of setup showing the apparatus used (ideally you should make your own; it doesn’t have to be anything complex. Using the figures provided in your handout usually is not a good idea because it does not look professional and also the symbols in the figures usually don’t match your symbols in the text).
2. First describe your apparatus (don’t include specific details like tee’s and channel numbers used, red lead & black lead etc.; for e.g. your circuit will still work the same even if you used ch6 and ch7 of the A/D to monitor and save your waveforms. It is useful to say that you used the analog channel in the A/D but the channel number is too much detail)
3. Include table of equipment and reference it in the text.
4. Include the R and C values used.
5. Describe the measurements that were made for the step and frequency response (e.g peak-to-peak amplitude and phase shift).
6. Don’t refer to your results in this section.
7. Don’t duplicate the lab procedure handout; also, don’t include too much detail – just the most important steps (i.e. the ones that could directly influence the interpretation of your data).

**Results**

1. Build discussion around figures/tables.
2. Discuss trends seen in plots.
3. Compare experimental results to theory – Be specific and quantitative (e.g. give percent difference).
4. Don’t repeat what is already in the Procedure section.
5. Before you discuss a figure, be sure to explain what it is. (e.g. Figure 2 shows the variation of the response amplitude ratio with frequency.)
6. Include tables of data where appropriate
7. Too many significant digits. (5.32V not 5.324567535890576 V) The number of significant digits that you can show is related to the uncertainty of your measurement (think about this).

**Figures**

1. Use symbols for data, use lines-only for theory.
2. No titles, only captions.
3. Include legend.
4. Include theoretical curves.
5. Use descriptive figure captions (not “y vs. x”); the reader should be able to follow what is presented in the figure by reading the caption.
6. Incorrect scaling of data.

**Appendix**

1. Include RC uncertainty analysis (please include a derivation of the end result for $U_r$) and show a sample calculation