

The lab reports and project paper that you will be writing for this class will ask two things of you:

1. use appropriate statistical methods to answer research questions and
2. clearly and concisely communicate the meaning of your statistics and graphs to a **reader who has a basic knowledge of statistics**.

Your paper or report should be organized, well-written with proper use of grammar, and contain sound reasoning and correct interpretations of statistical evidence. Also include *at least one* graphical display of your data.

1. Your lab reports should be organized into the following sections:
 - **Introduction:** describe the data and your research questions
 - **Results:** describe your statistical analysis and interpret your graphs and numbers
 - **Discussion:** summarize your findings and answer your research questions, describe any limitations of your analysis
 - **Technical Appendix:** Staple all relevant R commands and output to the end of your written report. Only including commands without output is not enough. You must appropriately comment your code (telling me what each section of code is doing), and edit your code and output (no typos or errors allowed).
2. Type your report in Word (or similar software) and use R (not Excel, Statkey or other software) for your analysis. You can use R Markdown to write up your reports but you need to take care to only include labeled and numbered graphical output from R in the main document. Commands and numerical output should be placed in the Technical Appendix. If you are interested in using Markdown talk to me for hints on its use for reports.
3. Carefully decide **appropriate graphs and numbers** to include. There is no need to show the same data in different forms (e.g. no need to show both a histogram and boxplot for the same variable). You also don't need to include all numbers given in R output if you only use a few in your analysis. You also don't need to "show" (or prove) skewness or outliers using numbers, just use your graphs to display skewness or outliers.
4. **Interpret** and give meaning to **all** graphs and numbers that you choose to include in your report. Do not include algebraic calculations or too much technical detail.
5. **Including Numbers: Never include R numerical output or commands.** Summarize needed output in a nicely formatted Word table or just integrate numbers into your writing. In you include tables, label them numerically (Table 1, Table 2, etc) and give each a title. Number in order of how they appear in the paper and refer to these tables by their number ("Table 1 displays summary statistics for income.").
6. **Including Graphs:** Resize all graphs appropriately so they fit nicely into your written report. Large graphs that take up most of a page with no, or very little, writing on the page impede the flow of the report and reduce its readability. Label all graphs numerically (Figure 1, etc.) as they occur in the paper, give each a title and refer to by number.

7. **Do not explain every step taken in your study.** For example, there is no need to include a statement such as “I used R to create a histogram of income and observed that the distribution was right skewed”. Instead just say “The distribution of income is skewed to the right (Figure 1)”.
8. Avoid using weak phrases like “The average height of men is higher than the average for women.” **Use numbers to bolster your explanation:** “The average height of men is three inches more than the average for women (68.5 vs. 65.5 inches).”
9. The **precision** of your data should dictate the precision of your statistics. In general, your statistics can have one to two more significant digits than your data. For example, if height is recorded to the nearest inch then the mean height should be reported as 65.5 (or 65.49) rather than the R value of 65.49268.
10. Sometimes a question posed in a study is **ambiguous** and there may be more than one way to correctly answer to the question. In grading your reports and paper, **I am most concerned with the logic of your conclusions and how you support your claim using data and statistical evidence.** I will consider the following questions when grading:
 - Are the statistical statements correct?
 - Are the graphs informative?
 - Are the conclusions based on sound evidence?
 - Is your analysis complete?
 - Is your paper organized and readable?