

1.5: Introduction to Statistical Writing

Dr. Bean - Stat 5100

1 Writing Fellows

There will be three writing-intensive assignments this semester. Two will be completed individually and one will be completed in groups. For each one of these assignments, you will be required to make two submissions of your paper. The first will be a rough draft submission that must be complete in the content, but might need some refinements in the presentation of the content. The second will be a final, polished version of the papers. Between the two submissions, each of you will be **required** to meet with one of our writing fellows. The contact information for the writing fellows for this class is found on the “Syllabus” tab of the course canvas page.

Important points on writing fellows:

- You are **required** to meet with a writing fellow as part of your grade for each paper you write. However, the writing fellows do not grade any aspect of your paper.
 - Note that points will be deducted if you are late to your appointment with your writing fellow.
- Writing fellows are equipped to help you improve the clarity and the formatting of your writing. They will not comment on the technical content of your paper.
- You do not have to take every suggestion the writing fellow gives you, but it is in your best interest to incorporate most of their suggestions.

2 Why so much writing?

For the undergraduate students:

- The university requires that you take a communications intensive course beyond ENGL 2010.
- The university has determined that this course contains enough opportunities to communicate (through writing and presentations) to qualify as such a course.
 - If this course was not a CI course, some of our undergraduate statistics majors would fall short of the requirements of graduation.

For the graduates:

- Most, if not all, of you will be required to communicate your research, often in the form of a thesis, dissertation, or journal article.
- The ability to effectively communicate your efforts in these venues is absolutely vital to the success of your research.
- Despite this importance, we offer very little training in how to write effectively.

For all:

- **The ability to effectively communicate quantitative information will give you a competitive advantage in graduate school or in the workforce.**

3 General Writing Tips

Use concise, straightforward language.

- Intelligent writing doesn't require using fancy words.
- Concise writing will help retain interest in what you are saying.

(start)

We first employed forward variable selection on our model. This told us that we should remove the variables X_2 and X_7 . We acknowledge that the aforementioned method is suboptimal for use in variable selection. We then tried backwards variable selection, which told us to remove X_1 , X_2 , X_4 , and X_{11} . Finally, we tried the stepwise variable selection approach which told us to remove X_2 and X_{11} . Because the backwards and stepwise regression both suggested the removal of X_2 and X_{11} , we decided that we would eliminate these variables from our model.

(improved)

We tried several variable selection techniques, including forward, backwards, and stepwise selection. Each method suggested we remove different variables, but backwards and stepwise selection both recommended the removal of X_2 and X_{11} . This agreement across selection methods prompted us to remove these variables in our final model.

Use active voice whenever possible

- Active voice is more concise and gives you ownership over your results.
- Personal pronouns are OK, but use “we” instead of “I”, even if you are the only author.

(start)

It was determined that the variable X_2 should be removed from the model.

(better)

We removed the variable X_2 from our model.

Make sure you provide meaning to the numerical results in the introduction and conclusion of your paper.

- Your ultimate goal is to persuade people that there is valuable information contained in the data.
- Simply presenting a table of results fails to persuade people as to why the results are important.
- Providing a “why” in your writing makes readers more likely to pay attention to your analysis.

4 Using LaTeX

- LaTeX is a markup language intended for scientific writing.
- It is particularly good for including **references** and **mathematical equations**.

Writing equations:

% Add a comment to your document (ignored when compiling the document).
\$... \$ Add an equation to the current line of text.
\$\$... \$\$ Put an equation on its own line.
\[... \] Put an equation on its own line.

Referencing Equations

You can also number and label equations to include them in the text.

```
\begin{equation}
E = mc^2
\label{eq1}
\end{equation}
\begin{equation}
Y = \beta_0 X_{i,1} + \epsilon
\label{regression}
\end{equation}
Reference Equation \ref{eq1} and \ref{regression} in the text.
```

$$E = mc^2 \tag{1}$$

$$Y = \beta_0 X_{i,1} + \epsilon \tag{2}$$

Reference Equation 1 and 2 in the text.

The same goes for referencing figures and tables.

```
\begin{figure}[H] % H command requires 'float' package
\centering
\includegraphics[width = 0.25\textwidth]{../figures/module1/usu.png}
\caption{This is the Utah State Logo}
\label{fig1}
\end{figure}
```

The USU logo is included in Figure \ref{fig1}.
\end{figure}



Figure 1: This is the Utah State Logo

The USU logo is included in Figure 1.

The equation environment includes commands for all the greek letters as well. Check out:

https://www.overleaf.com/learn/latex/List_of_Greek_letters_and_math_symbols

Document Headers

LaTeX Documents include document headers that allow you to customize the overall format of the final document. These headers can seem like a pain at first but they are extremely valuable in helping you quickly change the format of your paper depending on the context. A typical document header looks something like this:

```
\documentclass[11pt]{article}

% Add necessary packages
\usepackage{amsmath}

% Begin Document
\begin{document}

%% ADD ALL PAPER CONTENT HERE

\end{document}
```

Getting Started with LaTeX

There are several free document editors that allow you to start using LaTeX, most notably:

- Windows: MiKTeX (<https://miktex.org/download>)
- Mac: MacTeX (<http://www.tug.org/mactex/>)
- Linux: TeXLive (<http://www.tug.org/texlive/>)

You can also get started with an online LaTeX editor called Overleaf. (<https://www.overleaf.com/>)

5 Using Microsoft Word

Microsoft Word also has an equation editor that can be quickly accessed using the “alt + equal” keystrokes. Many latex commands, particularly those for greek variables, subscripts, and superscripts, are recognized in Microsoft’s equation editor.

Remember: All equations included in your homework or papers must use a professional equation editor environment. Formatting points will be taken away for equations written outside of such an environment such as $Y = b_0 + b_1x$. vs $Y = b_0 + b_1x$.