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Abstract

The text of your abstract. 200 or fewer words. It is intended to provide an overview of your paper and may be similar to your synopsis. Note that an abstract can only include one paragraph in this format. You may want to put your synopsis here as you work to refer to it easily.

Keywords: 3 to 6 keywords, that do not appear in the title

*The authors gratefully acknowledge ...

1 Introduction

This template will be used for you to submit your final project. You'll need to install the *rticles* package, make sure you have the agsm.bst file and bibliography.bib file, and the gfx folder and figure file in order to compile. If you make your own bibliography.bib file later, that's fine - change the name above to match your file name. You'll want the setup for the file to look the same in your repo as in the class repo, and then compile to asa_article when you knit. You should change the name of the file to something other than "test" though. Remember that if something goes wrong with the file, you can always look back at the class repo for the original files and their structure.

This template was adapted from the template Prof. Horton provided Stat 495 in Fall 2021, used with permission.

2 More on the template

This template demonstrates some of the basic LaTeX commands and syntax you'll need to know to use the `rticles` package to generate a readable report using R Markdown. Markdown allows various formatting and you can find formatting cheatsheets or guides online to assist as well. Here's an example with bullets and some advice:

- I would encourage you to look closely at this file and explore the various parts and pieces.
- I would suggest that you format your Rmd file so that you have only one sentence per line.
- It makes it *much* easier to see changes in your GitHub commits.

3 Verifications

This section will be just long enough to illustrate what a full page of text looks like, for margins and spacing.

Note that we can refer to sections (e.g., this is section 3, while the previous section was section 2).

Note that we should refer to work using the BibTeX system. Here we can reference papers by **?** and **?** through inline citations (see the `bibliography.bib` file for the reference database).

More work that is relevant can also be cited in a traditional fashion [**?**, **?**,**?**].

Note that you can capitalize proper nouns in citations [**?**] (again, see `bibliography.bib`).

We also test some other ways to do the citations, such as **?**, and [**?**]. These both work. The latter puts the citation in parentheses. You can also use **?**, though this seems to have similar behavior to just cite.

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. **With this spacing we have 30 lines per page.**

The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog. The quick brown fox jumped over the lazy dog.

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4 Examples

Lots of things can be done in this template.

Table 1: This is a sample table caption that should interpret the table!

Species	count
setosa	50
versicolor	50
virginica	50

```
iris %>%
  group_by(Species) %>%
  summarize(count = n()) %>%
  knitr::kable(
    caption = "This is a sample table caption that should interpret the table!")
```

Table 1 displays the number of irises per species.

```
iris %>%
  ggplot(aes(y = Sepal.Width, color = Species)) +
  geom_boxplot()
```

Figure 1 displays the side-by-side boxplots for Sepal.Width by Species.

Figure 2 displays a campus map.

5 LaTeX Examples

To shift into "tex" mode, it's pretty easy. You just need dollar signs.

The variables X_1 and X_2 are uncorrelated.

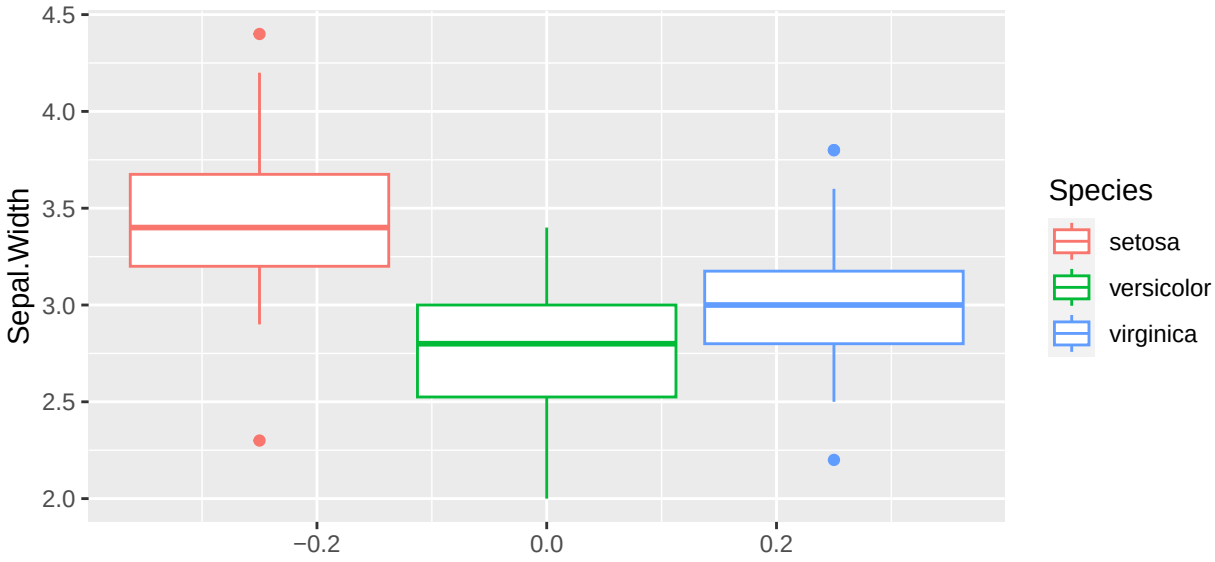

Figure 1: This is a sample figure caption that should interpret the figure!

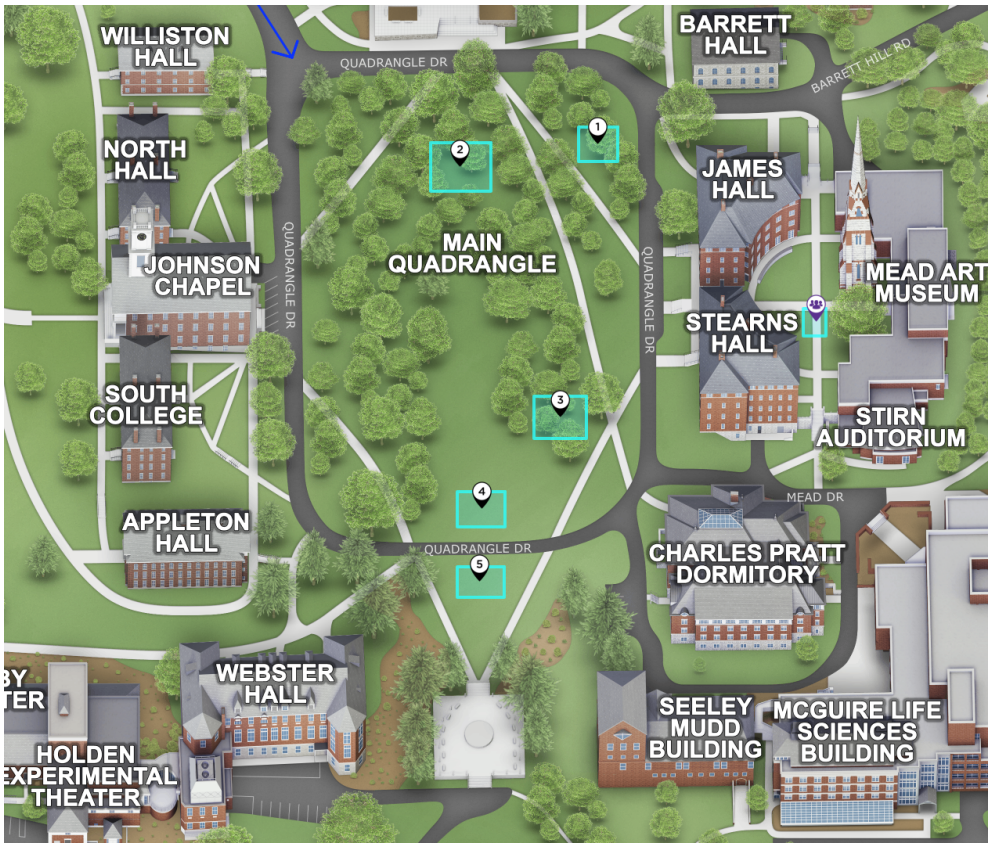

Figure 2: XX another sample figure caption

If you have multiple indices or items that need to go into a subscript or a superscript, you need curly brackets.

We want to look at X_{10} and X_{10}^{20}.

If you have a big equation, you probably want to set it on it's own, rather than try it in-line.

In regression, we assert (for two predictor variables) that

$$\mu_Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2.$$

Don't forget punctuation in your equations.

If you want to reference equations, you need to be a bit more formal:

$$\mu_Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2. \tag{1}$$

Now I can refer to the equation as Equation 1.

I'm going to borrow a lot of the examples below from the revision of my Probability textbook, so if the context is a little strange (meaning, not from our class), that's why.

You can do bulleted lists using LaTeX instead of RMarkdown formatting like this:

1. "Define the terms: continuous RV, probability density function, and cumulative density function.

2. Compute expectation and variance for continuous RVs.

3. Apply uniform and exponential distributions to appropriate problems.

4. Solve problems involving joint and marginal distributions in the continuous setting.

5. Extend independence, covariance, and correlation concepts to the continuous setting.

6. Work with uniform and exponential distributions in R to find probabilities and simulate problems." (Chapter 6 introduction)

In equations, you can also do alignments and adjust spacing with various commands. In text, you can also get italics and bold text. Here is some text with examples of these, including fractions in the equations.

"That is, we integrate a constant c over the bullseye region. This leads to

$$P(B) = \iint_B c\,dx\,dy = c\,[\text{Area}\,(B)] = \frac{c\pi}{16}. \tag{2}$$

What is c? As this is a probability model, the points in the sample space should add up or integrate to 1. The sample space is C, the target. This gives

$$1 = P(C) = \iint_C c\,dx\,dy = c\,[\text{Area}\,(C)] = c\pi$$

and thus $c = 1/\pi$. Plugging in c to Equation 2 gives

$$P(B) = \frac{1}{\text{Area}\,(C)} \iint_B dx\,dy = \frac{1}{16},$$

the proportion of the total area of the target taken up by the bullseye.

This gives the beginnings of a *continuous uniform probability model*. If Ω is a continuous set with all points equally likely, then for subsets $S \subseteq \Omega$,

$$P(S) = \frac{1}{\text{Area}\,(\Omega)} \iint_S dx\,dy = \frac{\text{Area}\,(S)}{\text{Area}\,(\Omega)}.$$

In one dimension, the double integral becomes a single integral and area becomes length. In three dimensions we have a triple integral and volume. (Chapter 6 introduction)''

Here is an example from Chapter 6 with an alignment actually needed for the two lines (the equals sign lines up):

$$\begin{aligned} 1 &= \int_{-\infty}^{\infty} ce^{-|x|}\,dx = \int_{-\infty}^{0} ce^{x}\,dx + \int_{0}^{\infty} ce^{-x}\,dx \\ &= 2c\int_{0}^{\infty} e^{-x}\,dx = 2c\left(-e^{-x}\right)\Big|_{0}^{\infty} = 2c, \end{aligned}$$

Here is an example from Chapter 6 with an array (for alignment) and text inserted into the equation using mbox.

A random variable X has density function

$$f(x) = \begin{cases} 2/5, & \text{if } 0 < x \leq 1 \\ 2x/5, & \text{if } 1 \leq x < 2 \\ 0, & \text{otherwise.} \end{cases}$$

I think most of you will use kable or gtsummary for generating tables, but if you want to make tables in LaTeX, you can do that too. Ask me for assistance if you want to do that - I'm not including examples here. Tables are MUCH easier to do in R using existing packages, imo, so I would recommend that over LaTeX anyway.

6 Your Choice of Structure

You are responsible for choosing the structure you want for the report, i.e. what sections and their names. Here are some examples that you could adapt, as appropriate. These are just examples - the first has more sections, some of which may make more sense as sub-sections of others. I'm just trying to give you examples. You don't have to have a conclusion or an introduction, etc. You'll need to find what works for you.

6.1 Example 1

- Introduction
- Background
- Topic X (Main exposition section)
- Applications in Literature
- Application to Data (your data)
- Conclusion

6.2 Example 2

- Introduction (including any relevant Background)
- Topic X (exposition and examples)
- Simulation Study

References