My title*

My subtitle if needed

First author Another author

February 8, 2024

First sentence. Second sentence. Third sentence. Fourth sentence.

1 TESTING GRAPHS

Our data (Table 1).

Table 1: Number of students enrolled in class, by gender

Gender	Number of students
0	1281
1	2604

```
# Install and load necessary packages


# Create a data frame with the given values
data <- data.frame(
  Category = c("Percent of records", "Grade change", "Positive grade change",
               "Negative grade change", "Female instructor", "Days between grade changes",
               "GPA", "Percent in College of Agriculture", "College of Business",
               "College of Engineering", "College of Human Sciences",
               "College of Liberal Arts", "College of Natural Resources",
               "College of Natural Sciences", "College of Veterinary Sciences",
               "Intra-university", "Observations"),
  All = c(100, 0.464, 0.439, 0.025, 44.9, 25.8, 3.04, 4.5, 10.8, 4.8,
```

*Code and data are available at: LINK.

```
            12.6, 32.2, 4.6, 23.3, 3.4, 3.9, 1341552),
    Female = c(53.4, 0.424, 0.404, 0.021, 50.0, 24.9, 3.13, 4.9, 8.6, 1.9,
               15.5, 33.6, 3.5, 23.2, 4.4, 4.4, 716772),
    Male = c(46.6, 0.509, 0.479, 0.031, 38.9, 26.7, 2.94, 4.0, 13.2, 8.2,
             9.1, 30.6, 5.9, 23.4, 2.3, 3.3, 624780)
  )

  # Create a kable table
  tbl <- kable(data, format = "html", align = "c") %>%
    kable_styling()

  # Print the table
  print(tbl)
```

```
<table class="table" style="margin-left: auto; margin-right: auto;">
 <thead>
  <tr>
   <th style="text-align:center;"> Category </th>
   <th style="text-align:center;"> All </th>
   <th style="text-align:center;"> Female </th>
   <th style="text-align:center;"> Male </th>
  </tr>
 </thead>
<tbody>
  <tr>
   <td style="text-align:center;"> Percent of records </td>
   <td style="text-align:center;"> 100.000 </td>
   <td style="text-align:center;"> 53.400 </td>
   <td style="text-align:center;"> 46.600 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> Grade change </td>
   <td style="text-align:center;"> 0.464 </td>
   <td style="text-align:center;"> 0.424 </td>
   <td style="text-align:center;"> 0.509 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> Positive grade change </td>
   <td style="text-align:center;"> 0.439 </td>
   <td style="text-align:center;"> 0.404 </td>
   <td style="text-align:center;"> 0.479 </td>
```

```
</tr>
<tr>
 <td style="text-align:center;"> Negative grade change </td>
 <td style="text-align:center;"> 0.025 </td>
 <td style="text-align:center;"> 0.021 </td>
 <td style="text-align:center;"> 0.031 </td>
</tr>
<tr>
 <td style="text-align:center;"> Female instructor </td>
 <td style="text-align:center;"> 44.900 </td>
 <td style="text-align:center;"> 50.000 </td>
 <td style="text-align:center;"> 38.900 </td>
</tr>
<tr>
 <td style="text-align:center;"> Days between grade changes </td>
 <td style="text-align:center;"> 25.800 </td>
 <td style="text-align:center;"> 24.900 </td>
 <td style="text-align:center;"> 26.700 </td>
</tr>
<tr>
 <td style="text-align:center;"> GPA </td>
 <td style="text-align:center;"> 3.040 </td>
 <td style="text-align:center;"> 3.130 </td>
 <td style="text-align:center;"> 2.940 </td>
</tr>
<tr>
 <td style="text-align:center;"> Percent in College of Agriculture </td>
 <td style="text-align:center;"> 4.500 </td>
 <td style="text-align:center;"> 4.900 </td>
 <td style="text-align:center;"> 4.000 </td>
</tr>
<tr>
 <td style="text-align:center;"> College of Business </td>
 <td style="text-align:center;"> 10.800 </td>
 <td style="text-align:center;"> 8.600 </td>
 <td style="text-align:center;"> 13.200 </td>
</tr>
<tr>
 <td style="text-align:center;"> College of Engineering </td>
 <td style="text-align:center;"> 4.800 </td>
 <td style="text-align:center;"> 1.900 </td>
 <td style="text-align:center;"> 8.200 </td>
</tr>
```

```
  <tr>
   <td style="text-align:center;"> College of Human Sciences </td>
   <td style="text-align:center;"> 12.600 </td>
   <td style="text-align:center;"> 15.500 </td>
   <td style="text-align:center;"> 9.100 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> College of Liberal Arts </td>
   <td style="text-align:center;"> 32.200 </td>
   <td style="text-align:center;"> 33.600 </td>
   <td style="text-align:center;"> 30.600 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> College of Natural Resources </td>
   <td style="text-align:center;"> 4.600 </td>
   <td style="text-align:center;"> 3.500 </td>
   <td style="text-align:center;"> 5.900 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> College of Natural Sciences </td>
   <td style="text-align:center;"> 23.300 </td>
   <td style="text-align:center;"> 23.200 </td>
   <td style="text-align:center;"> 23.400 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> College of Veterinary Sciences </td>
   <td style="text-align:center;"> 3.400 </td>
   <td style="text-align:center;"> 4.400 </td>
   <td style="text-align:center;"> 2.300 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> Intra-university </td>
   <td style="text-align:center;"> 3.900 </td>
   <td style="text-align:center;"> 4.400 </td>
   <td style="text-align:center;"> 3.300 </td>
  </tr>
  <tr>
   <td style="text-align:center;"> Observations </td>
   <td style="text-align:center;"> 1341552.000 </td>
   <td style="text-align:center;"> 716772.000 </td>
   <td style="text-align:center;"> 624780.000 </td>
  </tr>
</tbody>
```

</table>

2 Introduction

You can and should cross-reference sections and sub-sections.

The remainder of this paper is structured as follows. Section 3….

3 Data

Talk more about it.

And also planes (**?@fig-planes**). (You can change the height and width, but don't worry about doing that until you have finished every other aspect of the paper - Quarto will try to make it look nice and the defaults usually work well once you have enough text.)

Talk way more about it.

4 Model

The goal of our modelling strategy is twofold. Firstly,…

Here we briefly describe the Bayesian analysis model used to investigate… Background details and diagnostics are included in Appendix B.

4.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i|\mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \tag{1}$$
$$\mu_i = \alpha + \beta_i + \gamma_i \tag{2}$$
$$\alpha \sim \text{Normal}(0, 2.5) \tag{3}$$
$$\beta \sim \text{Normal}(0, 2.5) \tag{4}$$
$$\gamma \sim \text{Normal}(0, 2.5) \tag{5}$$
$$\sigma \sim \text{Exponential}(1) \tag{6}$$

Table 2: Explanatory models of flight time based on wing width and wing length

	First model
(Intercept)	1.12
	(1.70)
length	0.01
	(0.01)
width	−0.01
	(0.02)
Num.Obs.	19
R2	0.320
R2 Adj.	0.019
Log.Lik.	−18.128
ELPD	−21.6
ELPD s.e.	2.1
LOOIC	43.2
LOOIC s.e.	4.3
WAIC	42.7
RMSE	0.60

We run the model in R (R Core Team 2022) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

4.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular…

We can use maths by including latex between dollar signs, for instance θ.

5 Results

Our results are summarized in Table 2.

6 Discussion

6.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

6.2 Second discussion point

6.3 Third discussion point

6.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

References

Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. "Rstanarm: Bayesian Applied Regression Modeling via Stan." https://mc-stan.org/rstanarm/.

R Core Team. 2022. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.