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Analysis of Environmental Data
Lab 9 Report
November 10, 2021
Worked with Juliana Berube

Q1: State the null hypothesis of the Chi-square test. (Make sure you state the null hypothesis in terms of Brown Creeper presence/absence and edge/interior habitats.)

There is no difference in presence/absence of the Brown Creeper between edge and interior habitats.

Q2: Consider the results of your test and explain whether you think that Brown Creepers show a significant habitat preference. (Make sure you use the output of your statistical test to support your answer.)

Because the p-value is so low (1.386e-06), we can reject the null hypothesis. We can expect to see a difference in presence/absence in each habitat type. This will suggest preference in habitat type.

Q3: Show the R-code you can use to create a model fit (call it fit_species) of penguin body mass as predicted by penguin species.

```
fit_species=lm(formula=body_mass_g~species,data=penguins)
```

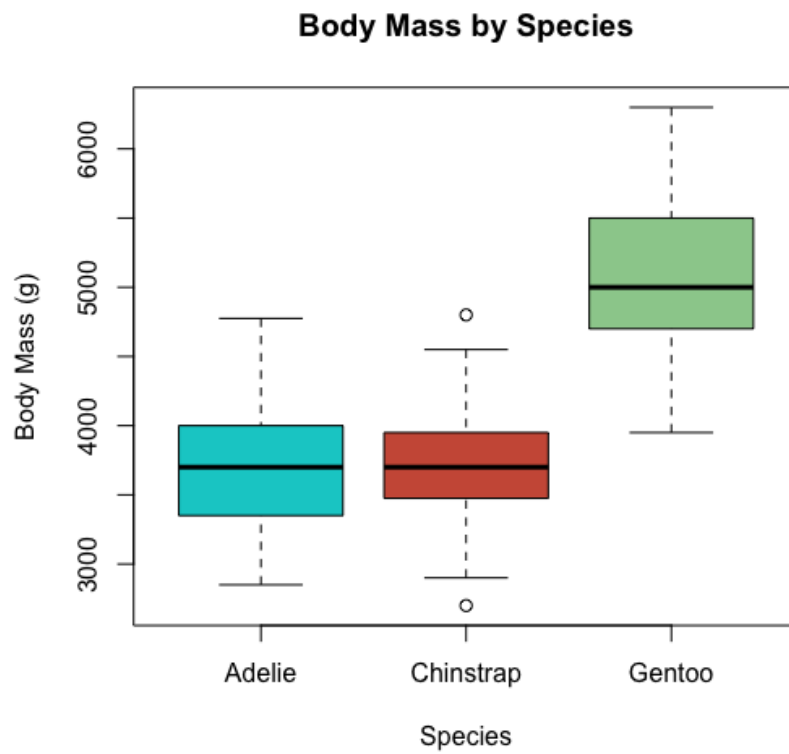
Q4: Show the R-code you can use to create a model fit (call it fit_sex) of penguin body mass as predicted by sex.

```
fit_sex=lm(formula=body_mass_g~sex,data=penguins)
```

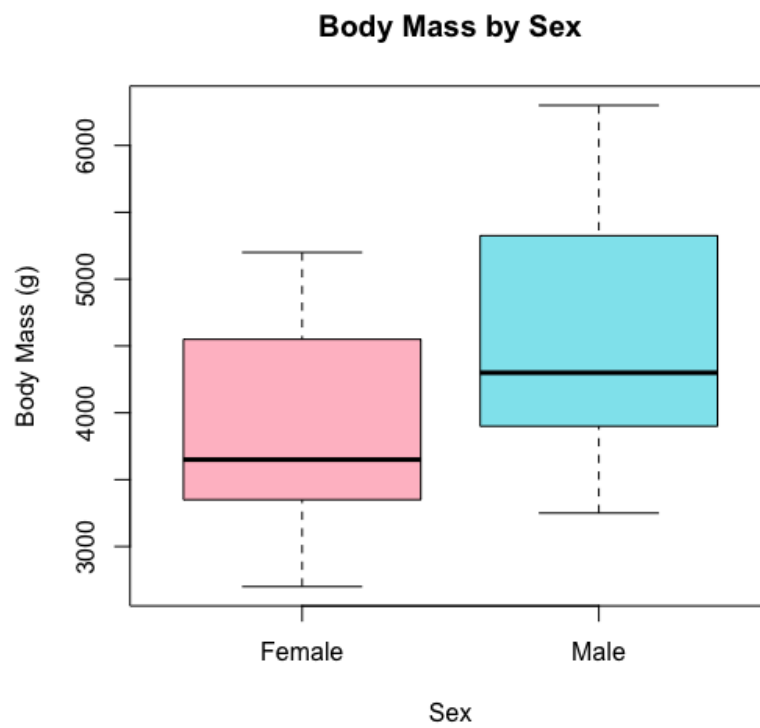
Q5: Show the R-code you can use to create a model fit (call it fit_both) of penguin body mass as predicted by species and sex.

```
fit_both=lm(formula=body_mass_g~species*sex,data=penguins)
```

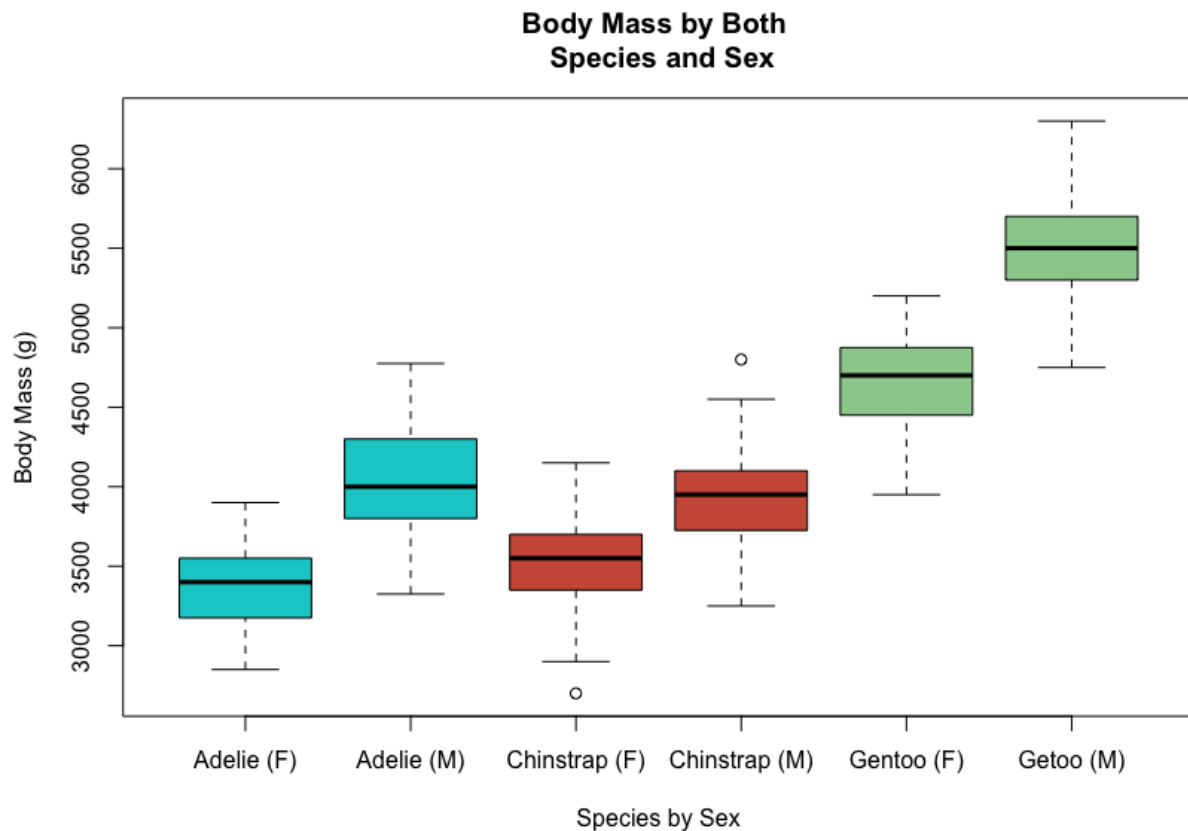
Q6: Include a conditional boxplot corresponding to your fit_species model.



Q7: Include a conditional boxplot corresponding to your fit_sex model.



Q8: Include a conditional boxplot corresponding to your fit_both model.
Your group labels must all correspond to the correct box, be visible, and sensible.



Q9: Based on the shapes of the boxes, which of the models (if any) do you think may have problems fulfilling the homogeneity assumption?

Body Mass by Species (size of the plots vary) and Body Mass by Sex (the means are not centered in the distributions)

Q10: State the null hypothesis of the Bartlett test.

The variances are equal for all samples.

Q11: What was the p-value from the Bartlett test of homogeneity for observations grouped by species? You can round your answer to 4 decimal digits.

0.0501

Q12: What was the p-value from the Bartlett test of homogeneity for observations grouped by sex? You can round your answer to 4 decimal digits.

0.0319

Q13: What was the p-value from the Bartlett test of homogeneity for observations grouped by both factors? You can round your answer to 4 decimal digits.

0.1741

Q14: Based on the results of the Bartlett tests, do you anticipate any issues with heterogeneity in any of the models? Make sure you justify your response with the results of your tests.

There is a definitive difference in variance in the body mass by sex. The p-value for the Bartlett test is smaller than 0.05, meaning significant evidence to reject the null (null: that the variances are the same). It is important to mention that the p-value for the Bartlett test for body mass by species is almost equal to 0.05. This means that interpreting the evidence to reject or fail to reject the null is on the tipping edge.