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Analysis of Environmental Data

Using Models 2 Lecture Assignment

November 28, 2021

Worked with Julia Vineyard

Q1: Re-create the conditional boxplot of penguin body mass conditioned on sex and species.

Chart, box and whisker chart

Description automatically generated

Q2: Based on the boxplots, do you think male penguins (of any species) are significantly heavier than female penguins? Explain your reasoning.

**Yes, for each of the species, the male median and box (25th-75th percentile) are not overlapping (in the same body mass range) with the female box. This suggests that the sex plays a significant role in body mass.**

Q3: Do you think adding sex to a model that already includes species will improve the model fit? Make sure you justify your answer based on the boxplots and not results of a statistical test.

**I think so. The box plot shown in question 1 suggests that sex influences body mass for each of the three species. Having both covariates show a more accurate portrayal of the effects of species and sex on penguin body mass.**

Q4: Show the R-code you used to build fit\_both.

fit\_both=lm(formula=body\_mass\_g~species\*sex,data=penguins)

Q5: What is the base case for the two-way model that includes sex and species?

**speciesAdelie (sexFemale)**

Q6: What are the names of the two coefficients (from the first column of the coefficient table) you need to calculate the average mass of female Chinstrap penguins?

**Intercept and speciesChinstrap**

Q7: What is the predicted average mass of female Chinstrap penguins in the interactive model?

**3527.21** = 3368.84 + 158.37

Q8: What is the observed average mass of female Chinstrap penguins, calculated from the penguins data?

**3527.206**

dat\_female\_chinstrap = subset(dat\_chinstrap, sex == "female")

mean(dat\_female\_chinstrap$body\_mass\_g)