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Analysis of Environmental Data

Final Data Analysis

Scatterplot of Delomys body mass and body length
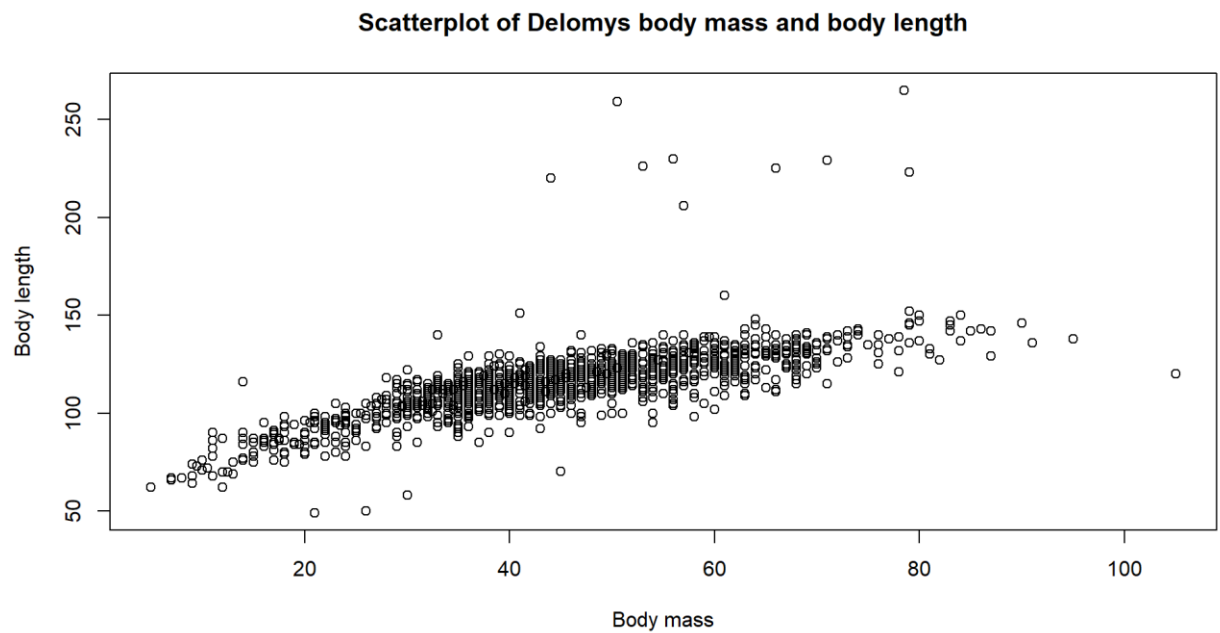
1.

The relationship between body mass and body length appears to be a positive somewhat linear relationship.

Histogram of Delomys body mass

Histogram of Delomys body length
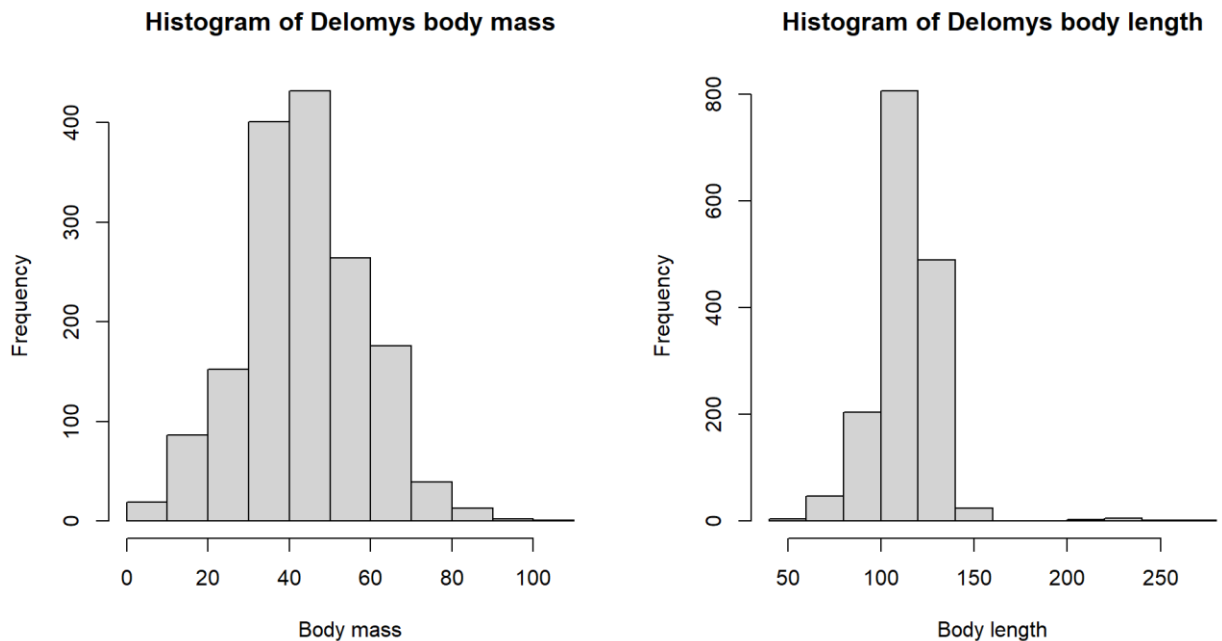
2.

The histograms are both skewed to the left of the x-axis range, with body length being more skewed than body mass. They do not appear normally distributed. We care about normal distribution because many statistical analyses assume that variables are normally distributed.

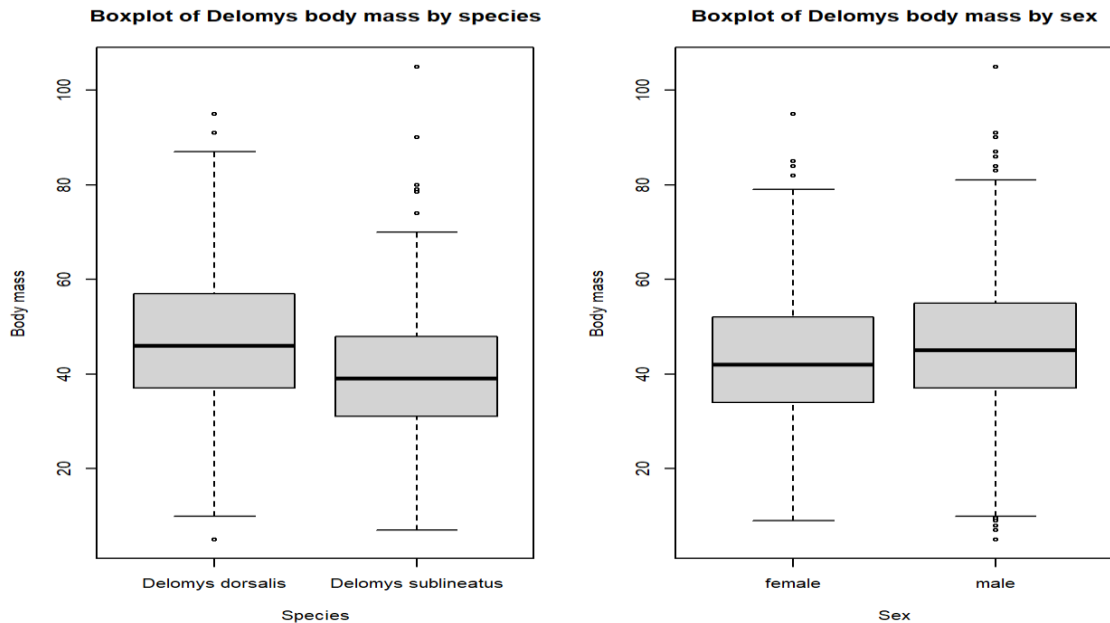3. Shapiro-Wilk normality test

   data: delomys$body_mass
   W = 0.99506, p-value = 4.33e-05
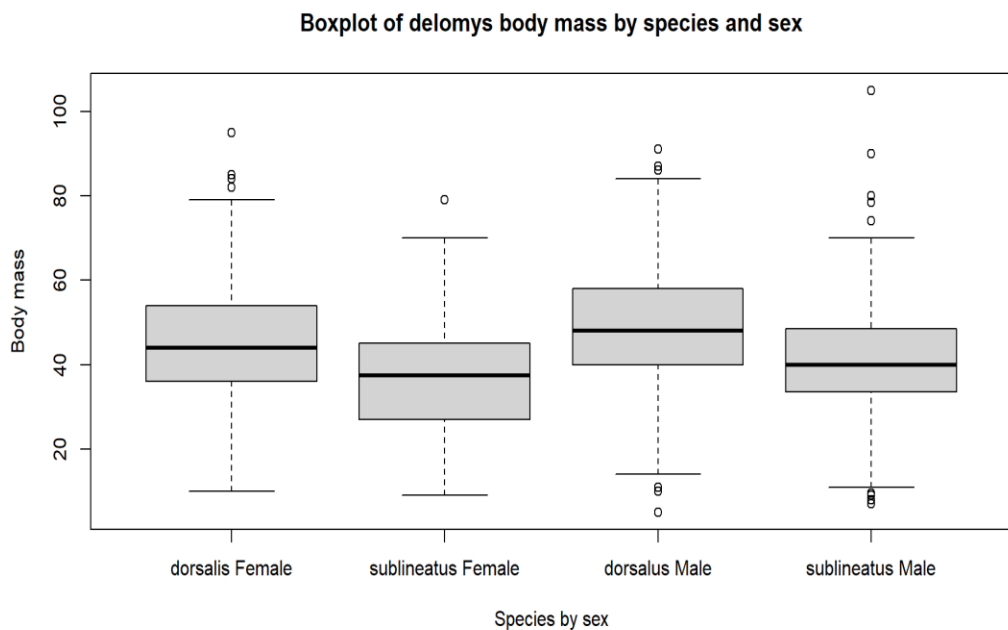
   > shapiro.test(delomys$body_length)

       Shapiro-Wilk normality test

   data: delomys$body_length
   W = 0.87609, p-value < 2.2e-16

   Both of the normality tests produced p values that are significantly smaller than 0.05 which means that the alternative hypothesis is accepted that these data are not normally distributed. This follows our visual assessment of skewed data in the histograms above.

Boxplot of Delomys body mass by species

Boxplot of Delomys body mass by sex

4.

Boxplot of delomys body mass by species and sex

There is graphical evidence to support that delomys dorsalis has slightly higher body mass on average than delomys sublineatus. Both species combined, there is evidence that males are slightly larger than females on average. There is also graphical evidence that suggests within each species, males are larger than females on average. Delomys dorsalis females might be slightly larger than delomys sublineatus males on average.

5. Based on graphical and numerical exploration, the residuals are not normally distributed for any of the five models.

6. Model #2 body mass by sex has the highest value for the Shapiro test, but still quite a bit smaller than 0.05 indicating the residuals are still not normally distributed for that model.

7. 0.875

8. Length= 76.12 +0.875(100)= 163.62

9. Length= 76.12+0.875(0)= 77

10. Female

11. Delomys dorsalus

12. Males are heavier

13. Delomys dorsalus is heavier

14. Sex and species are both statistically significant predictors of body mass

15. There is not a significant interaction between sex and species

16. The p values for the main effects are quite consistent among the 4 models

17. The two models with lowest AIC scores are the additive and interactive models.

18. I would choose the additive model because even though the interactive model has a lower AIC, the interaction between sex and species was not significant. I think the tradeoff between the slightly higher explanatory power and the additional complexity with the interactive model is not warranted in this case and the additive model does a better job of explaining the variation in the data with fewer parameters.