Mercy Melo
Mandy Klehr
Emma Greenle
Heather Siart
Devon Parsons
Hannah Korte
Julio Canas
Jessica Bonin
Megan Mitchell

In-Class Assignment: Models - 1

Q1: Create separate boxplots of body mass for male and female Adelie penguins. Your boxplots do not have to be in the same panel like mine. Show the R-code you used to make the plots.

boxplot(dat_ade$body_mass_g ~ sex, data = dat_ade,

   main = "Body Mass of Adelie Penguins",

   ylab = "body mass (g)")

Q2: Perform a one-sample t-test of the alternative hypothesis that female Adelie penguins have a body mass different from zero grams. Note that this is a very silly alternative hypothesis. Is this a one- or two-tailed test? Show your R-code.

sex_female = subset(dat_ade, sex == "female")

t.test(sex_female$body_mass_g, mu = 0)

It is a two-tailed test because we used the default value of "alternative", which is two-tailed.

Q3: Describe your conclusions based on the p-value of the t-test.

The body mass of female Adelie penguins is different from a value of 0.

Q4: Now, conduct a slightly less silly test: perform a one-sample t-test of the null hypothesis that male Adelie penguins have a mean body mass greater than 4000 grams. Is this a one- or two-tailed test?

sex_male = subset(dat_ade, sex == "male")

t.test(sex_male$body_mass_g, mu = 4000, alternative = "greater")

This test would be a one-tailed test because we are looking at body mass specifically being larger than 4000g, rather than the body mass just being different from 4000g.

Q5: Describe your conclusions based on the p-value of the t-test.

The p value we got was 0.1438, above a significance level of .05. This tells us that the male body mass is not larger than a mean of 4000 grams.

Q6: Conduct a two-sample t-test of the alternative hypothesis that male and female Adelie penguins have different mean body masses. Show your r-code.

t.test(sex_female$body_mass_g, sex_male$body_mass_g)

Q7: Describe your conclusions based on the p-value of the t-test.

The p-value is very small, which means that the mean body mass is different between male and female Adelie penguins..

Q8: Conduct a two-sample (one-tailed) t-test of the *directional* alternative hypothesis that male Adelie penguins are heavier than females.

t.test(sex_male$body_mass_g, sex_female$body_mass_g, alternative = "greater")

Q9: Conduct a two-sample (one-tailed) t-test of the *directional* alternative hypothesis that male Adelie penguins are lighter than females.

t.test(sex_male$body_mass_g, sex_female$body_mass_g, alternative = "less")

Q10: Explain why the p-values are so drastically different in the two directions.

Using the two-sided t-test, we didn't know which sex was larger, but using the p-values from the t-tests we are able to determine that the mean male mass is larger than female mass. The two-sided t- tests do not tell us which is larger because it only has a directional output. Using the two different t-tests with the different alternatives (greater or less) we are able to see the p values that describe a specific directionality.