Stat 6021: Guided Question Set 4

We will continue to use the dataset `penguins` from the `palmerpenguins` package. In the previous guided question set, we explored the linear relationship between body mass and flipper length of Gentoo penguins.

1. Produce a plot of body mass against flipper length for Gentoo penguins. Write the estimated linear regression equation.

2. What is the change in the predicted body mass (in grams) when flipper length increases by 1mm, for Gentoo penguins? Also report the corresponding 95% confidence interval for the change in the predicted body mass (in grams) when flipper length increases by 1mm.

3. Conduct a hypothesis test to determine whether or not there is a linear association between body mass and flipper legnth for Gentoo penguins. State the hypotheses, p-value, and conclusion in context.

4. Are your results from parts 2 and 3 consistent? Briefly explain.

5. Estimate the mean body mass (in grams) for Gentoo penguins with flipper lengths of 200mm. Also report the 95% confidence interval for the mean body mass (in grams) for Gentoo penguins with flipper lengths of 200mm.

6. Report the 95% prediction interval for the body mass (in grams) of a Gentoo penguin with flipper length of 200mm.

7. A researcher hypothesizes that for Gentoo penguins, the predicted body mass increases by more than 50 g for each additional mm in flipper length. Conduct an appropriate hypothesis test. What is the null and alternative hypotheses, test statistic, and conclusion?