Homework 7

PSC-103B

YOUR NAME HERE

2025-03-06

Important reminders:

- Do not insert your answer as comments inside a code chunk. They will be cut out when rendered as pdf.
- Instead, enter your answer as plain text after the '>'.
- Check your compiled document before submission to ensure your answers are displayed correctly.

Logistic Regression

For these logistic regression equations, we will be using the `wine` dataset that we used in lab, and that is available on the Canvas page for this homework assignment. We will be exploring how different predictors relate to whether a red wine is rated as good or bad.

1. Write a logistic regression model predicting the wine quality from the predictor of residual sugar. Be sure to create a binary version of the quality variable like I did in lab! Show your code and summary output. (1 point)

2. Write out the regression model predicting the log-odds of whether a wine was rated as good or not. Interpret the intercept and slope in terms of the log-odds. (3 points)

Intercept:

Slope:

3. Write out the regression model predicting the odds of whether or not a wine was rated as good or not. Interpret the intercept and slope in terms of the odds. (3 points)

Intercept:

Slope:

4. Now center your predictor variable of residual sugar, and re-run the logistic regression model. Show your code and summary output (1 point)

5. What is the new interpretation of the intercept (in terms of both the log-odds and the odds). (2 points)

6. Assume we had a wine that had a residual sugar content of 13. Calculate and interpret: the log-odds, the odds, and the probability of a wine with this residual sugar content being rated as good. (3 points).

$\log(O) =$

$O =$

$p =$

7. Fit a logistic regression model with both residual sugar and citric acid (neither of them centered) as predictors. Show your code and summary output (1 point).

8. Interpret the intercept and both slopes in terms of the log-odds (3 points).

Intercept:

Slope for residual sugar:

Slope for citric acid:

9. Interpret the intercept and slopes in terms of the odds. (3 points)

Intercept:

Slope for residual sugar:

Slope for citric acid:

Dummy Coding

Use the `penguins` dataset from the `palmerpenguins` package in R for this question.

```
library(palmerpenguins)
```

10. Fit a dummy-coded linear regression model using bill length as the outcome and Island as the predictor. Show your code and model output (1 point).

11. Interpret the intercept and slopes of the regression output. Which groups are significantly different from the reference group? (3 points).