Homework 4
Stat 215A, Fall 2022

Due: push a `homework4.pdf` file to your `stat-215-a` GitHub repo by **Sunday, November 13 11:59pm**

1 Classification

Read section 7.2 (p. 121) on probit models in Freedman and complete questions 1,2 , and 3 in Exercise set B on page 124.

2 The Hat Matrix

The Sherman Morrison formula gives us an expression for the inverse of a rank-1 update to a matrix. If A is an invertible $n \times n$ matrix, and $u, v \in R^n$.

$$\left(A + uv^T\right)^{-1} = A^{-1} - \frac{A^{-1}uv^TA^{-1}}{1 + v^TA^{-1}u} \tag{2.1}$$

Use this to prove equations (5.1) and (5.5) in Hoaglin, David C., and Roy E. Welsch. "The hat matrix in regression and ANOVA.". Note that they consider $\mathbf{x}_i$ a column vector - you can use either convention. Also, equation (5.5) contains a typo, and should be:

$$\hat{\boldsymbol{\beta}} - \hat{\boldsymbol{\beta}}_{(i)} = \cdots \tag{2.2}$$

3 Miscellaneous

- In the two examples introduced by Freedman, the practitioners seek to perform inference for some parameters of interest. How do the scientific questions the practitioners wish to answer compare to the standard statistical formulation of significance tests?
- Summarize a critique Freedman has for the "subjective" camp of statisticians. What are counterpoint would this camp would respond to this critique?
- Summarize a critique Freedman has for the "objective" camp of statisticians. What does Freedman propose as a possible remedy for this critique?