Homework 4 - Stat 215A, Fall 2020

Due: Thursday, November 19, 11:59 PM.

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.

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 $u, v \in \mathbb{R}^n$.

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

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:

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