Quiz1

Clark

Problem 1 (3 Pts)

You collect ACFT data on 6 Cadets, 3 firsties and 3 cows, and are interested in determining if there is a difference between the two classes so you build out the following linear regression model:

$$
\begin{aligned}
i &= \text{Cadet (1,...,6)} \\
x_i &= \text{1 if cow, 0 if firstie} \\
y_i &= \text{ACFT Score for Cadet } i \\
y_i &= \beta_0 + \beta_1 x_i + \epsilon_i \\
\epsilon_i &\sim N(0, \sigma)
\end{aligned}
$$

Write out the design (model) matrix $\boldsymbol{X}$ associated with this linear regression. Assume that Cadets 1-3 are Cows and Cadets 4-6 are Firsties.

Problem 2 (2 pts)

Write out the Projection matrix associated with $\boldsymbol{X}$.

Extra Credit (2 pts)

Give another model matrix that you could have used that has the same column space as $\boldsymbol{X}$. Write out the linear regression model associated with this model matrix.