MATH389: Exam 02

Name: _____

This is the take-home portion of the first exam. You are expected to work on this question on your own without any direct assistance. The use of notes and static internet resources are all allowed. The take home portion is worth 1/3 of your grade for the exam.

The elastic net estimator combines the lasso and ridge regression penalties. For a constant $\lambda > 0$ and blending parameter $\alpha \in [0, 1]$, the elastic net loss function is given by:

$$||y - Xb||_2^2 + \lambda \cdot \left(2 \cdot \alpha \cdot ||b||_1 + (1 - \alpha) \cdot ||b||_2^2\right)$$

Note that other resources may differ slight in terms of the exact way to scale the two penalties, but are all functionally equivalent. Answer the following questions regarding the elastic net estimator.

1. Define the partial residual r as we did in Lab 8. Compute a formula to update β_1 as a function of the partial residual.

2. As with lasso regression, the update you defined above can be easily generalized to the general case of updating β_j assuming the other coefficients are fixed. Use this to fill in the missing terms in the `exam02.Rmd` file. Knit the Rmarkdown file to HTML, print out the results, and hand them inclass with your second exam.