BIS557 Homework 4

This homework is due at the end of the day on November 22nd.

0. Create a "homework-4" vignette in your bis557 packages.
1. In Python, implement a numerically-stable ridge regression that takes into account colinear (or nearly colinear) regression variables. Show that it works by comparing it to the output of your R implementation.
2. Create an "out-of-core" implementation of the linear model that reads in contiguous rows of a data frame from a file, updates the model. You may read the data from R and send it to your Python functions fo fitting.
3. Implement your own LASSO regression function in Python. Show that the results are the same as the function implemented in the `casl` package.
4. Propose a final project for the class.
    - Your project should propose performing an analysis, benchmark comparison, or quantifying the behavior of a proposed model.
    - This is your chance to use the tools you've gained and apply them to some area of research you are interested in.
    - A traditional data analysis that uses a standard model is not sufficient. I'd rather see you try something new.
    - Some topics to consider if you are looking searching:
        - How do we penalize the weights in a deep learning model? What is the effect of doing this?
        - How can domain knowledge of a problem be built into the loss function of a deep learner for better prediction results?
        - Can you build a deep learner for classifying lung nodules? What kind of feature information is the most informative? Note, I have a cleaned, segmented lung data set I am willing to share, but you will probably need access to a GPU. The is provided through Yale's HPC services.
    - Your project will be written up as a 6-12 page extended abstract.
    - Your project will be due at the end of the last day of exams.