HOMEWORK # 6 DUE Oct 13

INSTRUCTIONS:

A) *For each answer,* include a:
   a) summary output table and/or graphs, as appropriate
   b) short statement about model fit to assumptions
   c) short answer that clearly answers the question, based on the results.

B) Provide your code in an Appendix, organized so that we can relate it to questions

C) Submit a pdf (with your name in the file name).

1. [2 pts] A classical, agricultural experiment (wheat.txt) grew a wheat variety with the same fertilizer amounts and water, but in three different soil categories, where randomly-selected fields were in either sandy, clay, or loam soils. Did clay and loamy soils yield significantly more wheat harvest (bushels/acre) than sandy soils, as expected? If so, by how much, on average?

2. [3 pts] The 2010 census (censusrb.txt) shows population size (`pop2010`), % of the population officially counted as living in poverty (`poverty`), and median household income (`med_income`) per each US county [2020 data for all these variables are not yet compiled]. It also shows whether a county was classified as red (`r` = Republican) or blue (`b` = Democrat) or unclear (`u`), based on the 2008 presidential vote. Based on these data, is there any support for the oft-repeated claim that “red” and blue” counties are economically different? If so, how much do red and blue counties differ for each of these two measures? And how much of the variation in each measure (i.e., `poverty` and `med_income`) is "explained" by these simple analyses?

3. [3 pts] Also using the censusrb.txt file: Do red and blue states differ significantly in population density, where red counties are supposedly more rural and blue counties are supposedly more urban? If so, what is the average (and standard deviation) of the difference in population between red and blue counties? And what % of variance in population density is “explained” by this political predictor?

4. [2 pts] Some plant extracts *may* be anti-cancer agents. To cut through the hype, a randomized experiment was conducted with 3 plant extracts (Drugs A, B, & C) and controls (a placebo) – see cancer.txt for the data. Cultures of cancer cells were dosed with the same concentrations of all drugs and then the percent of cancer cells that died was counted. Did plant extracts cause significant cancer cell death compared to the placebo treatment? If so, which treatment worked best, and *how much* better?