

Instructions: Test assumptions and compute the most appropriate statistical model to match each study. Present your final R output, including any "Call:" model description that comes with "summary()". Also be sure to answer the questions, and explain results in your own words.

1. [2 pts] A classical, agricultural experiment (wheat.txt) grew a variety of wheat with the same fertilizer amounts and water, but in three different soils, 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? If so, by how much, on average?
2. [4 pts] We GOTTA analyze political data! The census.txt file shows population size in 2010 (pop2010), % of the 2010 population below poverty (poverty), and median household income (med\_income) per US county. It also shows whether a county was classified as red (0 = Republican) or blue (1 = Democrat) or unclear (blank), based on the most recent presidential vote. Are red counties significantly more poor and less populated (i.e., more rural) than blue counties, as expected by media simplifications of the electorate? If so, by how much do red and blue counties differ for each of these two measures? And how much of the variation in each measure is "explained" by these simple analyses?
3. [2 pts] Some plant extracts may be anti-cancer agents (or may have no real effect). An experiment was conducted with 3 plant extracts (Drugs A, B, & C) and controls (a placebo). Cultures of cancer cells were dosed with the same concentrations of all drugs and then the percent of dead cells was counted (cancer.txt). Did plant extracts cause significant cancer cell death compared to the placebo treatment? If so, which treatment worked best?
4. [2 pts] Competition by exotic species may inhibit success of threatened species. An experiment (competition.txt) first heat-treated soils to kill most seeds, then mixed the soil and seeded random plots with a threatened species by itself (solo), or together with one of three exotic species. All plots had the same initial total number of seeds. At the end of the growing season the biomass (dry weight) of the threatened species was measured. Did exotics inhibit growth of the threatened species more than its own intraspecific competition? If so, rank the exotics for their inhibitory effect on the threatened species, and explain your ranking.