

1. Suppose an experiment was conducted to determine the effect of a fungal pathogen on plant growth. Ten pots, each containing two small plant seedlings, were randomly assigned to be treated with either a fungal pathogen or a mock treatment designed to serve as a placebo. Because of problems with cross contamination, both plants in any one pot had to receive the same treatment. Thus 5 pots and a total of 10 plants were treated with the fungal pathogen, and another 5 pots containing 10 plants altogether were treated with the mock treatment. After two weeks of growth following treatment, the weight of each plant was determined. The SAS file *hw5pr1.sas* contains the data along with code used by the researchers to analyze the data.

- a) What do the results of the analysis in *hw5pr1.sas* suggest about the effect of the fungal pathogen on plant weight? (For this question, assume that the analysis done by the researchers was correct.)
  - b) List the assumptions of single-factor analysis of variance. State whether each assumption is roughly satisfied in this case. Explain your reasoning.
  - c) What is the experimental unit in this experiment.
  - d) What is the observational unit in this experiment.
  - e) Find the mean response of the observational units corresponding to each experimental unit. Conduct one analysis of these means. Report the results of your analysis. Provide a test statistic, its degrees of freedom, a  $p$ -value, and a conclusion.
  - f) The results of the analyses conducted in parts (a) and (e) should differ considerably. Can you explain what features of the data are responsible for the difference in results? (For a hint about what is going on, read the first paragraph of Section 4.2, think about what might happen if each pot does not contain sufficient resources for two plants to grow, examine the weights for each pair of plants within a pot, and look at the residual plot for the first analysis where points are labeled according to pot number.)
2. Consider the data described in Problem 4 of Chapter 4 and provided in *ch4pr4.sas*.
- a) Are the single-factor analysis of variance assumptions satisfied for this dataset? List any assumption that appears to be violated.
  - b) Find a transformation of the data that seems to yield a dataset for which the assumptions of single-factor analysis of variance are roughly satisfied.