Statistics 5303
Spring 2016

Exam #1 Data

Our first exam is Wednesday, March 9. The exam is open book and open notes. Those of you who have your text and notes electronically on you laptops may bring and use your laptop (or tablets) to access the book and notes. However, you may not use R during the exam or communicate during the exam.

Analyze the two data sets below and bring printed notes on your analysis to class. Answer the exam questions on these data using your notes; your solutions should refer to specific analyses on specific pages of your notes (e.g., see Box-Cox plot on page 3). Attach your notes to your exam when done. Note: there will be some questions that do not involve these data.

In your analyses, remember to check for assumptions and think about interactions. Your analysis should go beyond just the ANOVA and what is significant; it should try to explain what is going on in the data.

This preliminary analysis should be considered part of your exam. *Do your own work!* Discuss these data only with the instructor.

(1) A trebuchet is a medieval siege weapon similar to a catapult. With a trebuchet, a weight on one end of a lever pulls that end of the lever down (and thus the other end up), and a rope on the other end of the lever acts as a sling to launch a projectile. Once the trebuchet is constructed, you can vary the distance that the projectile will fly by changing the length of the rope and the amount of weight. For this experiment, we use a small model trebuchet with strings of different lengths in place of the rope and metal washers used as weights.

We want to examine the effect of rope length and amount of weight on the distance that a projectile will fly. The treatments in this experiment are the combinations of weight (number of washers, 3, 5, 7, or 9) and length of "rope" (7, 8, 9, or 10 inches). The response is the distance in inches that the trebuchet will throw a small ball of putty. There are 48 runs, three for each of the factor/level combinations in random order.

Analyze these data to find the effects of the different factors on distance. The data for this experiment are in the file `trebuchet.txt` on the class web page.

(2) How do you cool your Coca-Cola? In this experiment we measure the time that it takes a room temperature container of Coca-Cola to reach 40 degree Fahrenheit. We want to compare the effects of cooling method (in the freezer, outside in some snow, in ice water, or in iced salt water) and type of container (metal can, glass, or plastic) on the length of time it takes for the liquid to reach the desired temperature. We perform 48 cooling trials, four for each of the combinations of container and cooling medium. These are done in random order. Unfortunately, two of the results are missing, as our roommate grabbed two of the plastic cups of drink from the freezer.

Analyze these data. We are particularly interested in which cooling medium to use. The data for the experiment on in the file `cooling.txt` on the class web site.