STAT 700
Homework 5 Problems
due Wed. Oct. 5

2 Problems. Please follow the Lab report directions off the homework web page.

1. **Please read Lab2: Two-Way ANOVA Section**. The survival times (in hours) for animals in an experiment whose design consisted of three poisons, four treatments, and four observations per cell (Ref: Rice, 1995)
We will use data available off the class web page:

http://www.rohan.sdsu.edu/~babailey/stat700/poison.dat

You can use the header information already in the file.

(a) Plot the data using strip charts and interaction plots. Describe any differences or interactions that you see.

(b) Conduct a two-way ANOVA to test the effects of the two main factors and their interactions. Give the R ANOVA table and state your conclusion. Include diagnostic plots of the residuals. Use the Bonferroni method for multiple comparisons to determine if there are significant pairwise difference among poisons and among treatments. (Make sure that a factor is a factor!)

(c) Box and Cox (1964) analyzed the reciprocals of the survival data, pointing out that the reciprocal of survival time can also be interpreted as rate of death. Conduct a two-way ANOVA, and compare your results to part (b).

2. **Please watch the Introduction to Bootstrap Video in the Course Documents Folder on Blackboard and read Example 1 from Lab: Nonparametric Bootstrap Lab linked off the Course Calendar.**

Two methods, A and B, were used in determination of the latent heat of fusion of ice (Natrella, 1963). The investigators wished to find out how much the methods differed. The dataset gives the change in total heat from ice at $-72°C$ to water $0°C$ in calories per gram of mass.

It is available off the class web page:
    `http://www.rohan.sdsu.edu/~babailey/stat700/ice.dat`

(a) Use the Nonparametric Bootstrap Lab `bootstrap` function to construct a 95% percentile bootstrap interval for the difference in the population means. Use $B = 1000$ bootstrap replicates. It is fine to call the `bootstrap` function two times. Make a histogram of the 1000 bootstrapped differences in the means.

(b) Compare your percentile interval to the one obtained by the `t.test` function using the `var.equal=T` option.

Note: You could bootstrap the difference in the medians, but let's use the means to be directly comparable to the t-test.