Statistical Computing 1, Stat 590 Homework 12 Name: _____
Fall 2015 Prof. Erik B. Erhardt

Part I. (100 points) Do all calculations in LaTeX + R + knitr. Insert computer text output and graphics to support what you are saying. For this assignment, all R code should well commented and be visible (`echo=TRUE`) in the document where you have written it.

(100^{pts}) **1. Bootstrap:** Do something of interest (to you) with the bootstrap. This is an open-ended question. In your research, projects, classes, or life you have had questions and used data to answer those questions. This assignment has five parts. Find a question (inference or test) and discuss the data, answer the question a traditional way, then implement a nonparametric bootstrap and a parametric bootstrap and compare all three answers.

A good job done on a easy to medium problem is better than a mediocre job done on a difficult problem.

It's always possible to take an easy problem and make it more interesting by being creative. For example, use a more obscure statistic. In a univariate problem, instead of using the mean, use the 50% trimmed-mean, median, 80th percentile, CV, IQR, range, maximum, kurtosis, (mean/kurtosis)/sqrt(IQR), etc. Though, convince me that the statistic you chose relates to the question you state. And do try to have a little fun, too.

(a) (30 pts) Define your question, plot the data you'll use to answer your question, and discuss the features of the data relative to the question you pose. Cite your data source.
(b) (20 pts) Answer the question a traditional way. Of course, include all the typical diagnostics (checking assumptions, etc.).
(c) (20 pts) Answer the question using the nonparametric bootstrap.
(d) (20 pts) Answer the question using a parametric bootstrap. What evidence might you have that the parametric assumptions are reasonable or not?
(e) (10 pts) Compare all of your answers to the original question.