

22S:166

Homework 5

Due Mon. Oct 8.

If you have uploaded solutions to the second part of problem 1 (the part using the `boot` function in the `boot` package) before class on Mon., Oct. 1, I will give you the solution to that part of the homework on that day.

1 Bootstrap

1. Consider the airconditioning data for which we performed a parametric bootstrap in class. Data are listed below.

```
hours
  3
  5
  7
 18
 43
 85
 91
 98
100
130
230
487
```

Carry out a *nonparametric* bootstrap analysis concerning the log of the sample mean as an estimator of the log of the population mean. Do the analysis twice: 1) using R code you write yourself, and 2) using the `boot` function in the `boot` package. Both analyses should:

- (a) Estimate the standard error of the log sample mean.
 - (b) Estimate the bias, and produce an “unbiased” estimate.
 - (c) Produce confidence intervals for the log population mean by the percentile method and the bias-corrected percentile method.
2. The bootstrap is not foolproof. To see this, consider analysis of a binomial model with “n” trials. You observe 0 successes. Discuss what would happen if you were to use the standard, non-parametric bootstrap in constructing a 95% C.I. for the binomial parameter p .

2 Jackknife

Carry out the same analysis of the airconditioning data, but use the jackknife to estimate the standard error, and bias. To produce a confidence interval, take your original estimate, plus or minus twice your estimated standard error. Write a few sentences comparing the jackknife results to those obtained with the bootstrap.