List 4 IBI 5081 – Monte Carlo Method I.

1. [CL, p.26] Suppose three mice who are littermates have weights 82, 107, and 93 g.

    (a) What is the mean weight of the mice?
    (b) How many possible bootstrap samples of this sample are there?
    (c) List all of the possible bootstrap samples as triples.
    (d) Compute the mean of each bootstrap sample.
    (e) Compute the mean of the resample means. How does this compare with the original sample mean?
    (f) What are the high and low values of the resample means?

2. [CL, p.26–27] Aflatoxin residues in peanut butter: In actual testing, 12 lots of peanut butter had aflatoxin residues in parts per billion of 4.94, 5.06, 4.53, 5.07, 4.99, 5.16, 4.38, 4.43, 4.93, 4.72, 4.92, and 4.96.

    (a) How many possible bootstrap resamples of these data are there?
    (b) Using R and the `sample()` function, or a random number table or generator, generate five resamples of the integers from 1 to 12.
    (c) For each of the resamples in previous item, find the mean of the corresponding elements of the aflatoxin data set.
    (d) Find the mean of the resample means. Compare this with the mean of the original data set.
    (e) Find the minimum and the maximum of the five resample means. This a crude bootstrap confidence interval on the mean. (If you had used 1000 resamples, and used the 25th and 975th largest means, this would have given a reasonable 95% confidence interval.)

[CL] Chernick, M. R., anf LaBudde, R. A. (2014). An introduction to bootstrap methods with applications to R. John Wiley & Sons.

[EG] Bradley Efron and Gail Gong. (1983) A Leisurely Look at he Bootstrap, the Jackknife, and Cross-Validation, The Amer. Stat. vol. 37,No. 1.

[RC] Cristian P. Robert and George Casella. Introducing Monte Carlo Methods with R. Series "Use R!". Springer