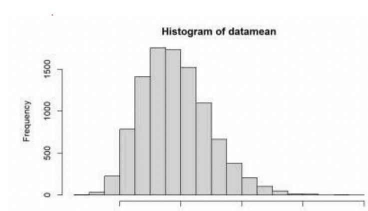
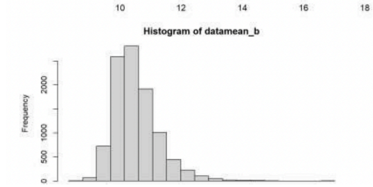
STT 380

In-Class Assignment 17

For this problem we will be looking at the data in the hypodata.csv file.

1. Read the data into R.
   a. hypodata <- read.csv('hypodata.csv')
   b. glimpse(hypodata)
2. Find the mean, standard deviation, and standard error.
   a. mean(hypodata$x) = 11.81398
   b. sd(hypodata$x) = [1] 35.31754
   c. sd(hypodata$x)/sqrt(length(hypodata$x)) = 1.116839
3. Assuming the data is normal, build a <u>99%</u> (2-sided) confidence interval with the t distribution
   a. mn + se*qt(c(0.005,0.995), length(data) - 1) = 8.931688 - 14.696273
4. Next, use standard bootstrapping to build the 99% confidence interval.
   a. datamean <- rep(0,10000)
   b. datasd <- rep(0,10000)
   c. for(i in 1:10000){ datasamp <- sample(data, length(data), replace = TRUE)
      i. datamean[i] <- mean(datasamp)
      ii. datasd[i] <- sd(datasamp)
      iii.
      iv. quantile(datamean, c(0.005, 0.995)) = 9.546193 - 15.209124
5. Use the Bayesian bootstrapping to build the 99% confidence interval.
   a. library(DirichletReg) weight <- rep(0,length(data)) datamean <- rep(0,10000) datasd <- rep(0,10000) for(i in 1:10000){ weight <- rdirichlet(1, rep(1,length(data))) datasamp <- sample(data, length(data),prob = weight, replace = TRUE) datamean[i] <- mean(datasamp) datasd[i] <- sd(datasamp) quantile(datamean, c(0.005, 0.995)) = 8.932163 - 17.995259
6. Plot a histogram of the simulations in (4) and (5). Does it look like the simulated means fit a normal distribution?
   a. No it does not
   b. hist(mpgmean_norm, breaks=30)
   c. hist(mpgmean_b, breaks=30)





7. How do the 3 confidence intervals compare?

    a. They are all different. The first is the smallest. The baysian is similar but with a larger interval.

8. Next, use both standard and Bayesian bootstrapping to build a 99% CI for the standard deviation. Plot a histogram of each. Is the graph symmetric or skewed?

    a. The graph is skewed

    b. quantile(mpgmean_b, c(0.005, 0.995)) =

    c. quantile(mpgmean_norm, c(0.005, 0.995))

    d.