Coins and Bootstraps

Question 1 [Coins]

Pick a coin, any coin. Toss it thirteen times. How many Heads occur? Repeat the experiment (thirteen coin tosses) n=50 times. Record the number of Heads you observe in each experiment. Plot:

- A scatter plot of the outcomes of these experiments
- a histogram of the same outcomes
- a running tally of (*total* # of Heads)/(*total* # of coin flips). The k^{th} index on the x-axis corresponds to k^{th} experiment.

Based on a visual inspection, do you believe your coin is *fair*?

Question 2 [So Unfair]

Pick another coin identical to the first coin. *Modify the coin to make it unfair*. Use any means you can think of to accomplish this. Repeat the steps in Question 1. Examine the plots. Do the plots support your claim that the coin is now *unfair*?

Question 3 [Gas Bootstrap Confidence Intervals]

Given a dataset, find the 95% bootstrap confidence interval for the mean of the data set.

Question 4 [Unfair Confidence]

Use your data set from Question 2 to generate a 95% bootstrap confidence interval for the probability of heads for your supposedly unfair coin. How does this modify your confidence in the claim that the coin is now unfair?