STAT 400 Discussion 8

Spring 2021 (Yu)

Exercise 1

In this problem, we will carry out a two-tailed hypothesis test for a population mean when the variance is known.

Brand X claims that the average sugar content in every serving is 15g.

You measure the sugar content of 25 distinct servings and find that the sample mean to be $\bar{X} = 15.5$.

Assume the population variance is 4.

At level of significance, $\alpha = 0.1$, can you reject Brand X's claim that the population mean is 15g? Report the cutoff critical value and the p-value.

Exercise 2

Suppose Alice gives Bob a rigged coin where the probability of heads is $p = 0.8$. Bob does not know this information, and decides to estimate the probability of landing on heads. After flipping it 100 times, he obtains 70 heads and 30 tails. Bob then computes a 95% confidence interval for the unknown parameter, p.

a) Compute the confidence interval for the population proportion.

b) What is the probability that the true value of p, 0.8, is inside the confidence interval you computed above?

c) Suppose Bob repeats this experiment 1000 times, where in each experiment, he flips the coin 100 times, and then computes a 95% confidence interval. About how many of the experiments would you expect the confidence interval he computes to contain the true value of p, 0.8?

d) Bob wants to estimate p with at least a 95% confidence interval of length 0.2. How many trials could he perform in order to ensure that he obtains such a confidence interval?