Lesson 08: Statistical Inference, Estimation for Single Populations

References

- Black, Chapter 8 Statistical Inference: Estimation for Single Populations (pp. 231-256)
- Davies, Chapter 17 Sampling Distribution and Confidence (pp. 378-384)
- Stowell, Chapter 5 Summary Statistics for Continuous Variables (pp. 70-71), Chapter 6 Tabular Data (pp.84-86)

Exercises:

1) Assume a random sample of size 100 is drawn from a normal distribution with variance 1. The average value of the sample is 50. Find a 95% confidence interval for the mean.

2) Assume the standard deviation for a normal distribution is equal to 100 units. Also assume we want to estimate the unknown mean with a 95% confidence interval of total width 8 units. Calculate the sample size required.

3) A random sample of 1600 registered voters are contacted and asked a variety of questions. For one question, 60% of the voters expressed approval and 40% disapproval. Calculate a 95% confidence interval for the proportion expressing approval.

4) A random sample of consumers are presented with two beverages in random order and asked which they prefer most. All the consumers expressed a preference. One beverage was preferred 85% of the time. Use this number to determine how large a sample of consumers would be needed to generate a 95% confidence interval with an overall width just less than 2% (i.e. from 84% to 86%)?

Data Set: hot_dogs.csv (Original source: Consumer Reports, June 1986, pp. 366-367)

Description: Results of a laboratory analysis of calories and sodium content of major hot dog brands. Researchers for Consumer Reports analyzed three types of hot dog: beef, poultry, and meat (mostly pork and beef, but up to 15% poultry meat). Fifty four observations are reported.

Variable Names:

1. Type = Type of hotdog (beef, meat, or poultry)
2. Calories = Calories per hot dog
3. Sodium = Milligrams of sodium per hot dog

1) Create boxplots and find 95% confidence intervals for the mean amount of calories in each Type of hot dog: beef, meat and poultry. Construct 99% one-sided lower confidence intervals for the mean amount of calories in each Type of hot dog: beef, meat and poultry.

2) Find a 95% confidence interval for the variance in the amount of calories found for each type of hotdog: beef, meat and poultry.