Statistical Inference for a Single Mean

Problem 1.

The caloric content of french fries depends on how they are prepared. A random sample of eight different 3 ounce servings of french fries from different fast-food restaurants had the calories shown below.

222	255	254	230	249	222	237	287

(a) Display the data in a stemplot. Are there any outliers or extreme skewness that would indicate that the population may be far from normal?

(b) Find the mean and standard deviation of the sample data.

(c) Find a 99% confidence interval for the mean number of calories in a 3 ounce serving of french fries at a fast-food restaurant, assuming that the population standard deviation is 20 calories.

Problem 2:

A machine to make twist-off caps for bottles produces caps with a mean diameter of 1.85 cm when it is working properly. If the mean diameter changes, the machine needs to be adjusted. A sample of 20 bottle caps has a mean of 1.87 cm. Assume that the population standard deviation is 0.05 cm.

(a) State null and alternative hypotheses.

(b) Find the test statistic.

(c) Draw a picture of the sampling distribution of the test statistic and shade in the area that represents the p-value.

(d) Use a table to find a numerical value or a range of numerical values for the p-value.

(e) Based on your analysis, is there strong evidence that the machine needs to be adjusted?

Problem 3.

In a sample of thirty bottles of beer, the mean volume is 11.96 ounces. You may assume that the population standard deviation is 0.16 ounces.

(a) Construct a 95% confidence interval for the population mean volume of beer.

(b) Is there evidence that the actual population mean volume of beer is less than 12 ounces? Test this formally with a hypothesis test. Include a statement of null and alternative hypotheses, a p-value calculation, and a conclusion in the context of the problem.