

STAT 614 Applied Statistics

Fall 2021

Homework #6

Confidence Intervals

1. A CI is desired for the true average stray-load loss μ (watts) for a certain type of induction motor when the line current is held at 10 amps for a speed of 1500 rpm. Assume that stray-load loss is normally distributed with $\sigma = 3.0$.
 - a. Compute a 95% CI for μ when $n = 25$ and $\bar{x} = 60$.
 - b. Compute a 95% CI for μ when $n = 100$ and $\bar{x} = 60$.
 - c. Compute a 99% CI for μ when $n = 100$ and $\bar{x} = 60$.
 - d. Compute an 82% CI for μ when $n = 100$ and $\bar{x} = 60$.
 - e. What does this imply about the sample size and confidence level as pertaining to the length of the intervals? Justify your answer.
2. An engineer is doing a study in a manufacturing setting on the lengths of paperclips. The sample he collected is in the dataset paperclips.xlsx. He would like to create a 2-sided confidence interval for the true mean length. Assume that the distribution of paperclips is normal.
 - a. Determine the mean, standard deviation, and standard error of the mean
 - b. Find a two-sided 95% confidence interval for the mean and interpret
 - c. Now the engineer decided that he is more concerned with the paperclips being too long and would like to know the average upper limit. Create the appropriate 95% confidence bound taking this into account. Interpret the interval
3. A Gallup poll was taken in which 1487 adults were surveyed and 43% of them said that they have a Facebook page.
 - a. Find the best point estimate of the proportion of *all* adults who have a Facebook page.
 - b. Find the 90% confidence interval estimate of the population proportion π .
 - c. Based on the results, can we safely conclude that fewer than 50% of adults have Facebook pages?
4. The sugar content of the syrup in canned peaches is normally distributed. A random sample of $n=10$ cans yields a sample standard deviation of $s = 4.8$ milligrams. Find a 95% two-side confidence interval for σ .