

Lab 6 (105 pts.) - One Sample t Confidence Interval and Test

Objectives: Confidence interval and significance tests

A. (50 points) the actual elapsed time of flights (Data Set: cleaned airline data set)

Please use the "ActualElapsedTime" variable in the cleaned dataset for this part.

1. (5 pts.) Code
2. (8 pts) Create a histogram, boxplot, and a Normal quantile plot of these data. Do you think that these data are normally distributed? Are there any outliers? Please justify your answer by referring to the graphs.
3. (10 pts.) One of the ways of creating a normal distribution from a non-normal distribution is to take the log transformation. Create a new variable which is the log transformation of the actual elapsed time. Re-create the histogram, boxplot and normal quantile plot of the transformed data. Comment on the skewness, outliers, and Normality of the transformed data. For the rest of this part, please use the transformed data.
4. (5 pts) Based on your observations in part 3, is it appropriate to analyze these data using the t procedures? Briefly explain your response.
5. (5 pts.) Find the mean, standard deviation, standard error, and margin of error for a confidence level of 99%. From these values, compute the 99% CI for μ . The CI is NOT to be calculated from the software package though the values mentioned in the first sentence maybe calculated via software. If the numbers are obtained via a software, please include the appropriate output. If the numbers are calculated by hand, please show your work. Work is required for the calculation of the CI.
6. (5 pts.) Report the 99% confidence interval for μ , the average actual elapsed time for flights in November. This answer is obtained from the software package so only the output needs to be reported. Compare with your answer in part 5.
7. (5 pts.) Interpret your 99% confidence interval for μ obtained in part 6. Be careful about your interpretation because you have transformed your variable.
8. (7 pts.) Without performing a hypothesis test (or looking at the output for the hypothesis test), would you reject or fail to reject the claim that the average actual elapsed time for the flights in November was 4.83 log minutes at a 1% significance level? What would the results be if the null value was 125.21 minutes (remember the units are log minutes for your confidence interval)?

B (55 points) the air time of flights (Data Set: cleaned airline data set)

Please use the log transformed "AirTime" variable in the cleaned dataset for this part.

1. (5 pts.) Code. There should no separate command for the confidence interval calculation. The results for the confidence interval should be obtained from one of the hypothesis tests.
2. (5 pts.) Do you think these data are Normally distributed? Use graphical methods to examine the distribution. Write a short summary of your findings.
3. (5 pts.) Is it appropriate to analyze these data using the t procedures? Briefly explain your response.

4. (3 pts) Find the mean, the standard deviation, and the standard error of the mean for this variable.
5. (10 pts) Find the 95% lower confidence bound for the mean log air time of flights in November. Please interpret your result. Remember that this is a transformed variable.
6. (10 pts) Do these data provide evidence that the average air time of flights in November is greater than 4.1 log minutes? Carry out a hypothesis test using the four-step procedure, with a significance level of 5%, state your hypotheses, the value of test statistic, the P -value, and your conclusions. Please provide the relevant output required for the steps and include all four steps written out by hand. No calculations are required because the data is obtained from the software output.
7. (10 pts) Do these data provide evidence that the average air time of flights in November is greater than 4.8 log minutes? Carry out a hypothesis test using the four-step procedure, with a significance level of 5%. Please see the directions for Part 6.
8. (7 pts) Compare your conclusions for parts 5, 6, and 7. How are they same? How are they different?