

Statistics – MTH160 029

Minitab Exercise 5 – Confidence Intervals & Hypothesis Testing

Due Date: Thursday, May 7, 2020 (midnight)

Objective of this exercise:

1. to increase your familiarity with the features and functions of Minitab.
2. to use Minitab to construct several confidence intervals (CI).
3. to use Minitab to perform hypothesis testing.

In this exercise, you will construct confidence intervals and perform hypothesis tests for three different situations (1) for the population mean when using a large sample of the airfares from Atlanta to Pittsburgh, (2) for the population mean when using a small sample of SAT scores and the population standard deviation is not known, and (3) for the population proportion.

Part I: Confidence Interval & Hypothesis Testing for the population mean when using a large sample

The data for this exercise is available on MyCourses: “Minitab Assignments” – Airfares. This is the file that you will import into Minitab. This is a file of the prices for 31 flights between Atlanta and Pittsburgh.

1. Retrieve the data and open a new project and import this worksheet file into the project. The airfares are in C1.
2. Are we concerned about the distribution of prices of all flights between Atlanta and Pittsburgh (why or why not)?
3. Using Minitab, construct a 90% confidence interval for the mean price of a flight between Atlanta and Pittsburgh. Cut and paste the confidence interval that Minitab produces into your document.
4. [Hypothesis Testing] Suppose that the Atlanta Chamber of Commerce claims that the average airfare from Atlanta to Pittsburgh is less than \$245. Is there sufficient evidence to support the claim at a .05 level of significance? Cut and paste the relevant output from Minitab into your document.

In your report, make sure you include:

- a. the null and alternative hypotheses
 - b. the (standardized) test statistic [from the Minitab output]
 - c. the p-value [from the Minitab output]
 - d. the decision
 - e. the interpretation.
5. Is the confidence interval and the interpretation of the hypothesis test consistent? Write a sentence or two explaining why you think it is consistent or not consistent.

Part II: Confidence Interval for the population mean when using a small sample (σ unknown)

The SAT scores for 12 randomly selected high school seniors are:

1704	1940	1518	2005	1432	1872
1998	1658	1825	1670	2210	1380

1. Enter the data either into a new project or a new worksheet in the same project.
2. Are we concerned about the distribution of prices of all SAT scores (why or why not)? Produce a normal probability plot (if the population is normal, the plotted points will form an approximately straight line and the P-value shown on the graph should be large (more than 0.05) – there is actually a hypothesis test being performed where the H_0 is the distribution is normal). Based on what you see in the normal probability plot, is it safe to assume that the sample of SAT scores comes from a normally distributed population.
3. Using Minitab, construct a 98% confidence interval for the mean SAT score. Cut and paste the confidence interval that Minitab produces into your document.
4. [Hypothesis Testing] Suppose that the high school claims that the average SAT score among the seniors is greater than 1750. Is there sufficient evidence to support the claim at a .01 level of significance? Cut and paste the relevant output from Minitab into your document.

Make sure you include:

- a. the null and alternative hypotheses
 - b. the (standardized) test statistic [from the Minitab output]
 - c. the p-value [from the Minitab output]
 - d. the decision
 - e. the interpretation.
5. Is the confidence interval and the interpretation of the hypothesis test consistent? Write a sentence or two explaining why you think it is consistent or not consistent.

Part III: Confidence Interval for the population proportion when the sample size is sufficiently large

In a survey of 1219 U.S. adults, 354 said that their favorite sport to watch is football (consider the TV ratings for the Super Bowl versus the World Series, NBA Championship, and Stanley Cup).

1. Verify that the sample size is sufficiently large so that the statistic \hat{p} is approximately normal. [Remember $n\hat{p}(1 - \hat{p}) \geq 10$].
2. Using Minitab, construct a 95% confidence interval for the population proportion of adults whose favorite sport to watch is football. Cut and paste the confidence interval that Minitab produces into your document.

3. [Hypothesis Testing] Suppose that the NFL claims that the proportion of adults whose favorite sport to watch is football is 27%. Is there sufficient evidence to reject the claim at a .05 level of significance? Cut and paste the relevant output from Minitab into your document.

Make sure you include:

- a. the null and alternative hypotheses
 - b. the (standardized) test statistic [from the Minitab output]
 - c. the p-value [from the Minitab output]
 - d. the decision
 - e. the interpretation.
4. Is the confidence interval and the interpretation of the hypothesis test consistent? Write a sentence or two explaining why you think it is consistent or not consistent.

Print your results for the calculations, graph and explanations.

PLEASE NOTE: Reports can be submitted electronically in the dropbox for Minitab Assignment 5. Acceptable electronic forms are Word (.doc or .docx), Rich Text Format (.rtf) or Portable Document Format (.pdf).