

UNIVARIATE STATISTICAL ANALYSIS

TUTORIAL SESSION 6

CONFIDENCE INTERVAL FOR POPULATION MEAN

Chapter 9

Question 9.43 (page.482) – Academic Procrastination

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Extra Question 1

A survey of 100 students in a college, a professor found that the average weekly time spent on doing after class workshop exercise was 15 hours per week. Assume that is normally distributed, with a population standard deviation of 5 hours per week, estimate the 99% confidence interval of the mean time for all students spent on doing workshop exercise each week.

*Question 9.42 (page. 482) – Medical Research

Part a. only

(Hint: You may refer to lecture 1 for the sample mean and sample standard deviation calculations)

One question in the survey asked how much time per year the children spent in volunteer activities. The sample mean was 14.76 hours and the sample standard deviation was 16.54 hours.

- a. Based on the reported sample mean and sample standard deviation, explain why it is not reasonable to think that the distribution of volunteer times for the population of South Korean middle school students is approximately normal.
 - b. The sample size was not given in the paper, but the sample size was described as large. Suppose that the sample size was 500. Explain why it is reasonable to use a one-sample t confidence interval to estimate the population mean even though the population distribution is not approximately normal.
 - c. Calculate and interpret a confidence interval for the mean number of hours spent in volunteer activities per year for South Korean middle school children.
- 9.42 ● Medical research has shown that repeated wrist extensions beyond 20 degrees increase the risk of wrist and hand injuries. Each of 24 students at Cornell University used a proposed new computer mouse design, and while using the mouse, each student's wrist extension was recorded. Data consistent with summary values given in the paper "Comparative Study of Two Computer Mouse Designs" (Cornell Human Factors Laboratory Technical Report RP7992) are given here.
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|----|----|----|----|----|----|----|----|----|----|----|----|
| 27 | 28 | 24 | 26 | 27 | 25 | 25 | 24 | 24 | 24 | 25 | 28 |
| 22 | 25 | 24 | 28 | 27 | 26 | 31 | 25 | 28 | 27 | 27 | 25 |
- a. Use these data to estimate the mean wrist extension for people using this new mouse design using a 90% confidence interval.
 - b. What assumptions are required in order for it to be appropriate to generalize your estimate to the population of Cornell students? To the population of all university students?
 - c. Based on your interval from Part (a), do you think there is reason to believe that the mean wrist extension for people using the new mouse design is greater than 20 degrees? Explain why or why not.
- 9.43 Students in a representative sample of 65 first-year students selected from a large university in England participated in a study of academic procrastination ("Study Goals and Procrastination Tendencies a Different Stages of the Undergraduate Degree," *Studies in Higher Education* [2016]: 2028–2043). Each student in the sample completed the Tuckman Procrastination Scale, which measures procrastination tendencies. Scores on this scale can range from 16 to 64, with

scores over 40 indicating higher levels of procrastination. For the 65 first-year students in this study, the mean score on the procrastination scale was 37.0 and the standard deviation was 6.44.

- a. Construct a 95% confidence interval estimate of μ , the mean procrastination scale for first-year students at this college.
 - b. Based on your interval, is 40 a plausible value for the population mean score? What does this imply about the population of first-year students?
- 9.44 The paper referenced in the previous exercise also reported that for a representative sample of 68 second-year students at the university, the sample mean procrastination score was 41.0 and the sample standard deviation was 6.82.
- a. Construct a 95% confidence interval estimate of μ , the population mean procrastination scale for second-year students at this college.
 - b. How does the confidence interval for the population mean score for second-year students compare to the confidence interval for first-year students calculated in the previous exercise? What does this tell you about the difference between first-year and second-year students in terms of mean procrastination score?
- 9.45 Suppose that a random sample of 50 bottles of a particular brand of cough medicine is selected and the alcohol content of each bottle is determined. Let μ denote the mean alcohol content (in percent) for the population of all bottles of the brand under study. Suppose that the sample of 50 results in a 95% confidence interval for μ of (7.8, 9.4).
- a. Would a 90% confidence interval have been narrower or wider than the given interval? Explain your answer.
 - b. Consider the following statement: There is a 95% chance that μ is between 7.8 and 9.4. Is this statement correct? Why or why not?
 - c. Consider the following statement: If the process of selecting a random sample of size 50 and then computing the corresponding 95% confidence interval is repeated 100 times, 95 of the resulting intervals will include μ . Is this statement correct? Why or why not?
- 9.46 The authors of the paper "Driving Performance While Using a Mobile Phone: A Simulation Study of Greek Professional Drivers" (*Transportation Research Part F* [2016]: 164–170) describe a study to evaluate the effect of mobile phone use by taxi drivers in Greece. Fifty taxi drivers drove in a driving simulator where they were following a lead car. The drivers were asked to carry out a conversation while driving, and the following distance (the distance between the taxi and the lead car) was recorded. The sample mean following distance