Chapter 8 Exercises

Prerequisites
All material presented in chapter 8

Selected answers

You may want to use the Analysis Lab and various calculators for some of these exercises.

Calculators:

Inverse t Distribution: Finds t for a confidence interval.
t Distribution: Computes areas of the t distribution.
Fisher's r to z': Computes transformations in both directions.
Inverse Normal Distribution: Use for confidence intervals.

1. When would the mean grade in a class on a final exam be considered a statistic? When would it be considered a parameter? (relevant section)

2. Define bias in terms of expected value. (relevant section)

3. Is it possible for a statistic to be unbiased yet very imprecise? How about being very accurate but biased? (relevant section)

4. Why is a 99% confidence interval wider than a 95% confidence interval? (relevant section & relevant section)

5. When you construct a 95% confidence interval, what are you 95% confident about? (relevant section)

6. What is the difference in the computation of a confidence interval between cases in which you know the population standard deviation and cases in which you have to estimate it? (relevant section & relevant section)

7. Assume a researcher found that the correlation between a test he or she developed and job performance was 0.55 in a study of 28 employees. If correlations under .35 are considered unacceptable, would you have any reservations about using this test to screen job applicants? (relevant section)

8. What is the effect of sample size on the width of a confidence interval? (relevant section & relevant section)

9. How does the t distribution compare with the normal distribution? How does this difference affect the size of confidence intervals constructed using z relative to those constructed using t? Does sample size make a difference? (relevant section)

10. The effectiveness of a blood-pressure drug is being investigated. How might an experimenter demonstrate that, on average, the reduction in systolic blood pressure is 20 or more? (relevant section & relevant section)

11. A population is known to be normally distributed with a standard deviation of 2.8. (a) Compute the 95% confidence interval on the mean based on the following sample of nine: 8, 9, 10, 13, 14, 16, 17, 20, 21. (b) Now compute the 99% confidence interval using the same data. (relevant section)

12. A person claims to be able to predict the outcome of flipping a coin. This person is correct 16/25 times. Compute the 95% confidence interval on the proportion of times this person can predict coin flips correctly. What conclusion can you draw about this test of his ability to predict the future? (relevant section)

13. What does it mean that the variance (computed by dividing by N) is a biased statistic? (relevant section)

14. A confidence interval for the population mean computed from an N of 16 ranges from 12 to 28. A new sample of 36 observations is going to be taken. You can't know in advance exactly what the confidence interval will be because it depends on the random sample. Even so, you should have some idea of what it will be. Give your best estimation. (relevant section)

15. You take a sample of 22 from a population of test scores, and the mean of your sample is 60. (a) You know the standard deviation of the population is 10. What is the 99% confidence interval on the population mean. (b) Now assume that you do not know the population standard deviation, but the standard deviation in your sample is 10. What is the 99% confidence interval on the mean now? (relevant section)

16. You read about a survey in a newspaper and find that 70% of the 250

people sampled prefer Candidate A. You are surprised by this survey because you thought that more like 50% of the population preferred this candidate. Based on this sample, is 50% a possible population proportion? Compute the 95% confidence interval to be sure. (relevant section)

17. Heights for teenage boys and girls were calculated. The mean height for the sample of 12 boys was 174 cm and the variance was 62. For the sample of 12 girls, the mean was 166 cm and the variance was 65. (a) What is the 95% confidence interval on the difference between population means? (b) What is the 99% confidence interval on the difference between population means? (c) Do you think the mean difference in the population could be about 5? Why or why not? (relevant section)

18. You were interested in how long the average psychology major at your college studies per night, so you asked 10 psychology majors to tell you the amount they study. They told you the following times: 2, 1.5, 3, 2, 3.5, 1, 0.5, 3, 2, 4. (a) Find the 95% confidence interval on the population mean. (b) Find the 90% confidence interval on the population mean. (relevant section)

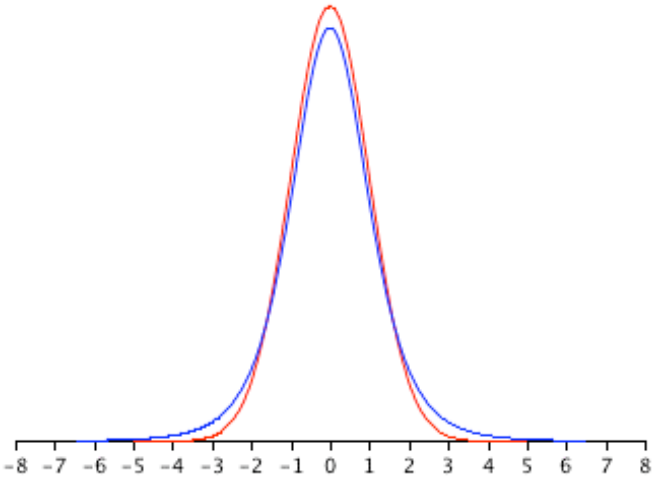
19. True/false: As the sample size gets larger, the probability that the confidence interval will contain the population mean gets higher. (relevant section & relevant section)

20. True/false: You have a sample of 9 men and a sample of 8 women. The degrees of freedom for the t value in your confidence interval on the difference between means is 16. (relevant section & relevant section)

21. True/false: Greek letters are used for statistics as opposed to parameters. (relevant section)

22. True/false: In order to construct a confidence interval on the difference between means, you need to assume that the populations have the same variance and are both normally distributed. (relevant section)

23. True/false: The red distribution represents the t distribution and the blue distribution represents the normal distribution. (relevant section)



Questions from Case Studies:

The following questions are from the Angry Moods (AM) case study.

24. (AM#6c) Is there a difference in how much males and females use aggressive behavior to improve an angry mood? For the "Anger-Out" scores, compute a 99% confidence interval on the difference between gender means. (relevant section)

25. (AM#10) Calculate the 95% confidence interval for the difference between the mean Anger-In score for the athletes and non-athletes. What can you conclude? (relevant section)

26. Find the 95% confidence interval on the population correlation between the Anger-Out and Control-Out scores. (relevant section)

The following questions are from the Flatulence (F) case study.

27. (F#8) Compare men and women on the variable "perday." Compute the 95% confidence interval on the difference between means. (relevant section)

28. (F#10) What is the 95% confidence interval of the mean time people wait before farting in front of a romantic partner. (relevant section)

The following questions use data from the Animal Research (AR) case

study.

29. (AR#3) What percentage of the women studied in this sample strongly agreed (gave a rating of 7) that using animals for research is wrong?

30. Use the proportion you computed in #29. Compute the 95% confidence interval on the population proportion of women who strongly agree that animal research is wrong. (relevant section)

31. Compute a 95% confidence interval on the difference between the gender means with respect to their beliefs that animal research is wrong. (relevant section)

The following question is from the ADHD Treatment (AT) case study.

32. (AT#8) What is the correlation between the participants' correct number of responses after taking the placebo and their correct number of responses after taking 0.60 mg/kg of MPH? Compute the 95% confidence interval on the population correlation. (relevant section)

The following question is from the Weapons and Aggression (WA) case study.

33. (WA#4) Recall that the hypothesis is that a person can name an aggressive word more quickly if it is preceded by a weapon word prime than if it is preceded by a neutral word prime. The first step in testing this hypothesis is to compute the difference between (a) the naming time of aggressive words when preceded by a neutral word prime and (b) the naming time of aggressive words when preceded by a weapon word prime separately for each of the 32 participants. That is, compute an - aw for each participant.
    a. Would the hypothesis of this study be supported if the difference were positive or if it were negative?
    b. What is the mean of this difference score? (relevant section)
    c. What is the standard deviation of this difference score? (relevant section)
    d. What is the 95% confidence interval of the mean difference score? (relevant section)
    e. What does the confidence interval computed in (d) say about the hypothesis.

The following question is from the Diet and Health (WA) case study.

34. Compute a 95% confidence interval on the proportion of people who are healthy on the AHA diet.

	Cancers	Deaths	Nonfatal illness	Healthy	Total
AHA	15	24	25	239	303
Mediterranean	7	14	8	273	302
Total	22	38	33	512	605

Answers:

11) (a) (12.39, 16.05)

12) (.43, .85)

15) (b) (53.96, 66.04)

17) (a) (1.25, 14.75)

18) (a) (1.45, 3.05)

26) (-.713, -.414)

27) (-.98, 3.09)

29) 41%

33) (b) 7.16