# *Mind on Statistics*

## Chapter 10

## Section 10.1

**Questions 1 to 4:** Some statistical procedures move from population to sample; some move from sample to population. For each of the following procedures, determine the correct direction.

1. *Statistical inference* takes information from the _____ to the _____.
   A. sample; population
   B. population; sample
   C. neither
KEY: A

2. *Sampling distributions* take information from the _____ to the _____.
   A. sample; population
   B. population; sample
   C. neither
KEY: B

3. *Confidence intervals* take information from the _____ to the _____.
   A. sample; population
   B. population; sample
   C. neither
KEY: A

4. *A census* takes information from the _____ to the _____.
   A. sample; population
   B. population; sample
   C. neither
KEY: C

5. Which statement is *not* true about confidence intervals?
   A. A confidence interval is an interval of values computed from sample data that is likely to include the true population value.
   B. An approximate formula for a 95% confidence interval is sample estimate ± margin of error.
   C. A confidence interval between 20% and 40% means that the population proportion lies between 20% and 40%.
   D. A 99% confidence interval procedure has a higher probability of producing intervals that will include the population parameter than a 95% confidence interval procedure.
KEY: C

6. Which statement is *not* true about the 95% confidence level?
   A. Confidence intervals computed by using the same procedure will include the true population value for 95% of all possible random samples taken from the population.
   B. The procedure that is used to determine the confidence interval will provide an interval that includes the population parameter with probability of 0.95.
   C. The probability that the true value of the population parameter falls between the bounds of an already computed confidence interval is roughly 95%.
   D. If we consider all possible randomly selected samples of the same size from a population, the 95% is the percentage of those samples for which the confidence interval includes the population parameter.
KEY: C

7.  A random sample of 600 adults is taken from a population of over one million, in order to compute a confidence interval for a proportion. If the researchers wanted to decrease the width of the confidence interval, they could
    A.  decrease the size of the population.
    B.  decrease the size of the sample.
    C.  increase the size of the population.
    D.  increase the size of the sample.
KEY: D

8.  A random sample of 600 adults is taken from a population of over one million, in order to compute a confidence interval for a proportion. If the researchers wanted to decrease the width of the confidence interval, they could
    A.  decrease the size of the population.
    B.  decrease the size of the sample.
    C.  increase the size of the population.
    D.  increase the size of the sample.
KEY: D

9.  Which of the following quantities does *not* affect the width of a confidence interval?
    A.  The confidence level.
    B.  The sample proportion.
    C.  The sample size.
    D.  The population size.
KEY: D

10. The general format for a confidence interval can be written as:  sample estimate $\pm$ multiplier $\times$ standard error. In creating a confidence interval for a proportion, the standard error is:
    A.  $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
    B.  $2\times\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
    C.  $\sqrt{\frac{1}{n}}$
    D.  $\sqrt{\frac{p(1-p)}{n}}$
KEY: A

11. In a poll of $n = 200$ randomly selected individuals, 60 people said they are opposed to the death penalty for persons convicted of murder.  Which choice correctly shows the calculation of the margin of error for a 95% confidence interval for the population proportion opposed to the death penalty?
    A.  $\sqrt{\frac{1}{60}}$
    B.  $2\times\sqrt{\frac{0.60(1-0.60)}{200}}$
    C.  $2\times\sqrt{\frac{0.30(1-0.30)}{200}}$
    D.  $2\times\sqrt{\frac{0.30(1-0.30)}{60}}$
KEY: C

**Questions 12 to 16:** A randomly selected sample of 400 students at a university with 15-week semesters was asked whether or not they think the semester should be shortened to 14 weeks (with longer classes). Forty-six percent of the 400 students surveyed answered *yes*.

12. Which one of the following statements about the number 46% is correct?
    A. It is a sample statistic.
    B. It is a population parameter.
    C. It is a margin of error.
    D. It is a standard error.
KEY: A

13. Which one of the following description of the number 46% is *not* correct?
    A. point estimate
    B. population parameter
    C. sample estimate
    D. sample statistic
KEY: B

14. Based on the sample data, what is the standard error of the sample proportion of students who answered *yes* to the question?
KEY: 0.0249

15. If the sample proportion of students who answered *yes* to the question was 36% instead of 46%, would the margin of error be smaller or larger?
KEY: smaller

16. If the sample consisted of 300 students instead of 400 students, but the sample proportion of students who answered *yes* to the question was still 46%, would the margin of error be smaller or larger?
KEY: larger

17. What is the fundamental rule for data inference, or what property must samples have before valid inferences can be made about the population?
KEY: The fundamental rule for data inference is that the sample can be considered to be a representative, or preferably random, sample from the population with regard to the question(s) of interest.

## Sections 10.2

**Questions 18 to 20:** Suppose that a 95% confidence interval for the proportion of first-year students at a school who played in intramural sports is 35% plus or minus 5%.

18. The confidence level for the confidence interval is
    A. 5%
    B. 35%
    C. 95%
    D. None of the above
KEY: C

19. The margin of error for the confidence interval is
    A. 5%
    B. 35%
    C. 95%
    D. None of the above
KEY: A

20. The 95% confidence interval for the proportion of students playing intramural sports is
    A. 25% to 45%
    B. 30% to 35%
    C. 35% to 40%
    D. 30% to 40%
KEY: D

21. If the confidence level is increased, which of the following must also be increased?
    A. sample estimate
    B. multiplier
    C. standard error
    D. none of the elements would be increased
KEY: B

22. If the sample size is increased but the sample proportion remains the same, which of the following must also be increased?
    A. sample estimate
    B. multiplier
    C. standard error
    D. none of the elements would be increased
KEY: D

23. The multiplier for a confidence interval is determined by
    A. the desired level of confidence and the sample size.
    B. the desired level of confidence but not the sample size.
    C. the sample size but not the desired level of confidence.
    D. neither the sample size nor the level of confidence.
KEY: B

**Questions 24 to 26:** Suppose that a confidence interval for a population proportion $p$ is to be calculated. For each sample size $n$ and sample proportion $\hat{p}$ find the approximate margin of error for a 95% confidence interval ("the 95% margin of error").

24. Sample size $n = 100$ and sample proportion $\hat{p} = 0.50$
    A. 0.05
    B. 0.10
    C. 0.25
    D. 0.50
KEY: B

25. Sample size $n = 60$ and sample proportion $\hat{p} = 0.35$
    A. 0.062
    B. 0.084
    C. 0.123
    D. 0.228
KEY: C

26. Sample size $n = 1000$ and sample proportion $\hat{p} = 0.35$
    A. 0.0003
    B. 0.011
    C. 0.025
    D. 0.030
KEY: D

**Questions 27 to 30:** Suppose that a confidence interval for a population proportion $p$ is to be calculated. For each confidence level find the appropriate z* multiplier.

27. The z* multiplier for a 98% confidence interval is
    A. 0.8365
    B. 2.26
    C. 2.33
    D. None of the above
KEY: C

28. The z* multiplier for a 80% confidence interval is
    A. 1.28
    B. 0.840
    C. 0.788
    D. None of the above
KEY: A

29. The z* multiplier for a 72% confidence interval is
    A. 0.580
    B. 0.764
    C. 1.08
    D. None of the above
KEY: C

30. The z* multiplier for a 60% confidence interval is
    A. 0.84
    B. 0.7995
    C. 0.99
    D. None of the above
KEY: A

**Questions 31 to 34:** In a nationwide survey of $n = 1,030$ adults, 6% answered *yes* to the question "During the last year did anyone break into or somehow illegally get into your home or apartment?"

31. A 95% confidence interval for the proportion of all Americans who had their homes broken into is
    A. 0.048 to 0.072
    B. 0.045 to 0.075
    C. 0.043 to 0.077
    D. 0.041 to 0.079
KEY: B

32. A 99% confidence interval for the proportion of all Americans who had their homes broken into is
    A. 0.048 to 0.072
    B. 0.045 to 0.075
    C. 0.043 to 0.077
    D. 0.041 to 0.079
KEY: D

33. A 90% confidence interval for the proportion of all Americans who had their homes broken into is
    A. 0.048 to 0.072
    B. 0.045 to 0.075
    C. 0.043 to 0.077
    D. 0.041 to 0.079
KEY: A

34. A 98% confidence interval for the proportion of all Americans who had their homes broken into is
    A. 0.048 to 0.072
    B. 0.045 to 0.075
    C. 0.043 to 0.077
    D. 0.041 to 0.079
KEY: C

**Questions 35 to 38:** In a survey of $n = 950$ randomly selected individuals, 17% answered *yes* to the question "Do you think the use of marijuana should be made legal or not?"

35. A 95% confidence interval for the proportion of all Americans in favor of legalizing marijuana is
    A. 0.150 to 0.190
    B. 0.146 to 0.194
    C. 0.142 to 0.198
    D. 0.139 to 0.201
KEY: B

36. A 90% confidence interval for the proportion of all Americans in favor of legalizing marijuana is
    A. 0.150 to 0.190
    B. 0.146 to 0.194
    C. 0.142 to 0.198
    D. 0.139 to 0.201
KEY: A

37. A 98% confidence interval for the proportion of all Americans in favor of legalizing marijuana is
    A. 0.150 to 0.190
    B. 0.146 to 0.194
    C. 0.142 to 0.198
    D. 0.139 to 0.201
KEY: C

38. A 99% confidence interval for the proportion of all Americans in favor of legalizing marijuana is
    A. 0.150 to 0.190
    B. 0.146 to 0.194
    C. 0.142 to 0.198
    D. 0.139 to 0.201
KEY: D

**Questions 39 to 42:** In a past General Social Survey, 87% of a random sample of $n = 990$ respondents answered *yes* to the question "Would you approve of an adult male punching a stranger if the stranger had broken into the man's house?"

39. A 95% confidence interval for the proportion of all Americans who approve of punching an intruder is
    A. 0.852 to 0.888
    B. 0.849 to 0.891
    C. 0.845 to 0.895
    D. 0.842 to 0.898
KEY: B

40. A 99% confidence interval for the proportion of all Americans who approve of punching an intruder is
    A. 0.852 to 0.888
    B. 0.849 to 0.891
    C. 0.845 to 0.895
    D. 0.842 to 0.898
KEY: D

41. A 90% confidence interval for the proportion of all Americans who approve of punching an intruder is
    A. 0.852 to 0.888
    B. 0.849 to 0.891
    C. 0.845 to 0.895
    D. 0.842 to 0.898
KEY: A

42. A 98% confidence interval for the proportion of all Americans who approve of punching an intruder is
    A. 0.852 to 0.888
    B. 0.849 to 0.891
    C. 0.845 to 0.895
    D. 0.842 to 0.898
KEY: C

**Questions 43 to 45:** A 95% confidence interval for the proportion of young adults who skip breakfast is found to be 0.20 to 0.27.

43. Which of the following is a correct interpretation of the 95% confidence level?
   A. There is a 95% probability that the true proportion of young adults who skip breakfast is between 0.20 and 0.27.
   B. In about 95% of all studies for which this procedure is used, the confidence interval will cover the true population proportion, but there is no way to know if this interval covers the true proportion or not.
   C. If this study were to be repeated with a sample of the same size, there is a 95% probability that the sample proportion would be between 0.20 and 0.27.
   D. The proportion of young adults who skip breakfast 95% of the time is between 0.20 and 0.27.
KEY: B

44. Which of the following is the correct interpretation of the 95% confidence interval?
   A. There is a 95% probability that the proportion of young adults who skip breakfast is between 0.20 and 0.27.
   B. If this study were to be repeated with a sample of the same size, there is a 95% probability that the sample proportion would be between 0.20 and 0.27.
   C. We can be 95% confident that the sample proportion of young adults who skip breakfast is between 0.20 and 0.27.
   D. We can be 95% confident that the population proportion of young adults who skip breakfast is between 0.20 and 0.27.
KEY: D

45. From the information provided, we can determine that
   A. $\hat{p} = 0.235$ and margin of error = 0.035.
   B. $\hat{p} = 0.235$ and margin of error = 0.07.
   C. $p = 0.235$ and margin of error = 0.035.
   D. $p = 0.235$ and margin of error = 0.07.
KEY: A

46. A poll is done to estimate the proportion of adult Americans who like their jobs. The poll is based on a random sample of 400 individuals. What is the "conservative" margin of error of this poll?
   A. 0.10
   B. 0.05
   C. 0.04
   D. 0.025
KEY: B

47. A sample of $n = 168$ students was asked, "Do you believe in love at first sight?" The choices below show confidence intervals, in scrambled order, for 90%, 95%, 98%, and 99% confidence levels for the population proportion who would answer yes. Which choice gives the 99% confidence interval?
   A. 0.56 to 0.68
   B. 0.52 to 0.72
   C. 0.53 to 0.71
   D. 0.55 to 0.69
KEY: B

48. Suppose that 200 different polling organizations and academic researchers all do surveys in which the same question is asked. All 200 research groups construct a 95% confidence interval for the proportion who would say "yes" to this question. About how many of the 200 different 95% confidence intervals will *not* capture the true population proportion?
    A.  0
    B.  5
    C.  10
    D.  190
KEY: C

49. In a survey of $n = 100$ people, 10% are left-handed. Using the "exact" formula for margin of error, calculate the margin of error for a 95% confidence interval.
    A.  0.03
    B.  0.05
    C.  0.06
    D.  0.10
KEY: C

50. Suppose that 90%, 95%, 98%, and 99% confidence intervals are computed (using the same sample) for a population proportion. Which confidence level will give the narrowest interval?
    A.  99%
    B.  98%
    C.  95%
    D.  90%
KEY: D

51. You plan to use a conservative margin of error of 2%. How large a sample size do you need?
    A.  100
    B.  400
    C.  2500
    D.  None of the above
KEY: C

52. You plan to determine an approximate 95% confidence interval for a population proportion; you plan to use a conservative margin of error of 10%. How large a sample size do you need?
    A.  100
    B.  400
    C.  2500
    D.  None of the above
KEY: A

53. Which of the following is the minimum sample size that could be used to guarantee that the margin of error for a confidence interval for a proportion is no more than 0.025?
    A.  100
    B.  400
    C.  1600
    D.  2500
KEY: C

54. You plan to determine an approximate 95% confidence interval for a population proportion; you plan to use a conservative margin of error of 5%. How large a sample size do you need?
    A. 100
    B. 400
    C. 2500
    D. None of the above
KEY: B

55. When creating a confidence interval for a proportion the conservative margin of error (studied in Chapter 5) and the margin of error found by taking 2 standard errors are closest to each other when
    A. the true proportion $p$ is close to 0.
    B. the true proportion $p$ is close to 1.
    C. the true proportion $p$ is close to .5.
    D. the true proportion $p$ is close to the sample proportion $\hat{p}$.
KEY: C

56. Suppose that 90% and 98% confidence intervals are both computed for a population proportion (using the same sample). Which confidence level will give the narrowest interval?
    A. 90%
    B. 98%
    C. It depends on the value of the sample proportion.
    D. It depends on the value of the true population proportion.
KEY: A


**Questions 57 to 60:** A 95% confidence interval for $p$ the proportion of supermarket customers who do not buy house-brand products at all is calculated and turns out to be: (0.18, 0.46). For each of the following statements determine whether it is true or false.

57. The point estimate of $p$ equals 0.40.
    A. True
    B. False
KEY: B

58. The above confidence interval was constructed with a margin of error of 14 percentage points.
    A. True
    B. False
KEY: A

59. The standard error of the sample proportion $\hat{p}$ is equal to 0.0714.
    A. True
    B. False
KEY: A

60. There is a 95% probability that the population proportion of supermarket customers who do not buy house-brand products at all lies between 18% and 46%.
    A. True
    B. False
KEY: B

61. Explain what a margin of error of 5% means for a survey result if 35% of the people from a random sample are overweight.

KEY: The 5% margin of error means that the difference between the population proportion of overweight people and the sample proportion of 35% will be no greater than 5% (the margin of error) in about 19 of every 20 random samples of the same size used in the survey.

62. Explain what a confidence level of 95% means in a 95% confidence interval.

KEY: The 95% confidence level means that, in the long run, the procedure used to determine the interval will provide an interval that captures the population value about 95% of the time.

63. In a past General Social Survey, 37% of a random sample of $n = 1035$ respondents answered yes to the question, "Have you ever been punched or beaten by another person?" Calculate an approximate 95% confidence interval for the proportion of all Americans who have been punched: use the approximate margin of error (or the "95% margin of error").

KEY: (0.340, 0.400)

64. In a past General Social Survey, 54% of a random sample of 444 men answered yes to the question," Have you ever been punched or beaten by another person?" Calculate an approximate 95% confidence interval for the proportion of all Americans who have been punched. Use the approximate margin of error (or the "95% margin of error").

KEY: (0.493, 0.587)

65. In a past General Social Survey, 23% of a random sample of 591 women answered yes to the question, "Have you ever been punched or beaten by another person?" Calculate an approximate 95% confidence interval for the proportion of all Americans who have been punched. Use the approximate margin of error (or the "95% margin of error").

KEY: (0.195, 0.265)

66. For a randomly selected sample of 40 first-year students at a University, 20% received a grade of A in their required course in English. Calculate a 90% confidence interval for the proportion of all first-year students who received an A in English.

KEY: (0.096, 0.304)

67. In a randomly selected sample of 100 students at a University, 85% had use of a laptop computer. Calculate a 99% confidence interval for the proportion of all students who had use of a laptop computer.

KEY: (0.758, 0.942)

68. In a randomly selected sample of 500 students at a University, 80% say they plan to graduate within 4 years. Calculate a 95% confidence interval for the proportion of all students who plan to graduate within 4 years.

KEY: (0.765, 0.835)

69. An Anti-Smoking organization wishes to determine what percentage of students in the state of Pennsylvania smoke cigarettes at least once a day. The organization will randomly sample 2400 students. In the sample they obtain, 450 students say they smoke cigarettes at least once a day. Calculate a 95% confidence interval for the proportion of all students in the state of Pennsylvania that smoke cigarettes at least once a day.

KEY: (0.172, 0.203)

**Questions 70 to 76:** Suppose that a 95% confidence interval for the proportion of teen drivers who were involved in a car accident is found to be (0.1425, 0.2875).

70.    What is the value of the point estimate for the population proportion of teen drivers who were involved in a car accident?

KEY:  0.215

71.    What is the value of the standard error of the sample proportion?

KEY: 0.037

72.  Does the 95% confidence level imply that $P(0.1425 < p < 0.2875) = 0.95$?
    A.  Yes
    B.  No

KEY: B

73.  Does the 95% confidence level imply that $P(0.1425 < \hat{p} < 0.2875) = 0.95$?
    A.  Yes
    B.  No

KEY: B

74.  Consider the following statement: "If the sampling procedure were repeated many times, this would result in many different 95% confidence intervals. We would expect that 95% of the time, the true value of the population proportion would fall between 0.1425 and 0.2875." Does this statement correctly interpret the meaning of the 95% confidence level?
    A.  Yes
    B.  No

KEY: B

75.    What is the 90% confidence interval for the population proportion of teen drivers who were *not* involved in a car accident based on this data?

KEY: (0.724, 0.846)

**Questions 76 to 79:** A television station plans to ask a random sample of 400 city residents if they can name the news anchor on the evening news at their station. They plan to fire the news anchor if fewer than 10% of the residents in the sample can do so. Suppose that 12% of city residents in the sample could name the anchor when asked.

76.    What is the value of the point estimate for the population proportion of city residents who can name the news anchor on the evening news at their station?
KEY:  0.12

77.    What is the value of the standard error of the sample proportion?
KEY: 0.016

78.    Calculate a 95% confidence interval for the population proportion of city residents who can name the news anchor on the evening news at their station.
KEY: (0.088, 0.152)

79.    Explain in your own words what the 95% confidence level implies.
KEY:  If repeated samples of size 400 were taken, 95% of the resulting confidence intervals would contain the population proportion of city residents who can name the news anchor on the evening news at their station.

**Questions 80 to 82:** Data is to be gathered to estimate the proportion of residents who will vote for Mr. Treehouse in the coming city election. A random sample of 650 voters is interviewed and 306 of them say that they will support Mr. Treehouse.

80.    What is the value of the point estimate for the population proportion of residents who will vote for Mr. Treehouse in the coming city election?
KEY: 0.4708

81.    What is the standard error of the sample proportion?
KEY: 0.0196

82.    Is it reasonable to conclude that Mr. Treehouse may win the election?
KEY: No, since the sample proportion is not even greater than 0.50.

# Section 10.3

**Questions 83 and 84:** Random samples from two age groups of brides (200 brides under 18 years and 100 brides at least twenty years old) showed that 50% of brides in the under 18 group were divorced after 15 years, while 40% of brides in the 20 or older age group were divorced after 15 years. The difference between the two proportions is 0.10, with a standard error of 0.0604.

83. What is a 95% confidence interval for the difference between the population proportions of brides who are divorced within 15 years (brides under 18 − brides at least 20)?
    A. (−0.018, 0.218)
    B. (−0.123, 0.023)
    C. (−0.040, 0.160)
    D. None of the above
KEY: A

84. What is a 99% confidence interval for the difference between the population proportions of brides who are divorced within 15 years (brides under 18 − brides at least 20)?
    A. (−0.123, 0.023)
    B. (−0.056, 0.256)
    C. (−0.040, 0.160)
    D. None of the above
KEY: B

85. In a recent poll of 500 13-year-olds, many indicated to enjoy their relationships with their parents. Suppose that 200 of the 13-year olds were boys and 300 of them were girls. We wish to estimate the difference in proportions of 13-year old boys and girls who say that their parents are very involved in their lives. In the sample, 93 boys and 172 girls said that their parents are very involved in their lives. What is a 96% confidence interval for the difference in proportions (proportion of boys minus proportion of girls)?
    A. (−0.2015, −0.0151)
    B. (−0.1973, −0.0194)
    C. (−0.1978, −0.0289)
    D. None of the above
KEY: A

86. In the Youth Risk Behavior Survey (a study of public high school students), a random sample showed that 45 of 675 girls and 103 of 621 boys had been in a physical fight on school property one or more times during the past 12 months. What is an approximate 95% confidence interval for the difference in proportions of students who had been in a fight (proportion of boys minus proportion of girls)?
KEY: (6.38%, 13.5%)

87. A study was conducted to learn about the proportions of U.S. residents who do not have medical insurance. Independent random samples of 942 U.S. women and 754 U.S. men were obtained. Of those sampled, 181 women and 181 men said that they do not have medical insurance. Calculate a 90% confidence interval for the difference in proportions (proportion of men minus proportion of women).
KEY: (0.0147, 0.0911)

**Questions 88 to 90:** Many people now-a-days use e-mail to communicate with family and friends and as a primary source of communication at their job. Is there a difference between the use of e-mail for men with a college education and those without? A survey in a large city reveals that out of 230 males with a college degree, 212 use e-mail more than twice a day. Out of the 150 without a college education, 122 use e-mail more than twice a day.

88. What is the estimate for the difference between the proportions of men with and without a college degree who use e-mail often?
KEY: 0.1084

89. What is the standard error of the estimate?
KEY: 0.0364

90. Calculate a 98% confidence interval for the difference in proportions.
KEY: (0.0237, 0.1931)

**Questions 90 to 93:** A survey at a large public university reveals that many students hold a (part-time) job while going to college. Out of 127 female students surveyed, 95 have a job and out of 143 male students, 97 have a job.

91. What is the estimate for the difference between the proportions of female and male students who have a job while going to college?
KEY: 0.0697

92. What is the standard error of the estimate?
KEY: 0.0549

93. Calculate a 95% confidence interval for the difference in proportions.
KEY: (−0.0378, 0.1772)

**Questions 94 and 95:** A poll was conducted in order to get an idea of the demand for vegetarian meals at restaurants. The study was commissioned by the Vegetarian Resource Group and was published in the Vegetarian Today. A random sample of 1100 U.S. adults was asked whether or not they sometimes order a vegetarian dish (one without meat, fish, or fowl) when dining out. Those who conducted the survey collected many characteristics of the participants, including political party affiliation. In this sample, 600 identified themselves as Democrats and 500 identified themselves as Republicans. Of those sampled, 252 Democrats and 200 Republicans said that they sometimes order a dish without meat, fish, or fowl when they eat out.

94. Find a 95% confidence interval for the difference between the two population proportions of people that sometimes order a vegetarian meal when going out to eat. Let group 1 refer to Democrats and group 2 refer to Republicans.
KEY: $(0.42 − 0.40) ± 1.96(0.0298) \rightarrow 0.02 ± 0.058 \rightarrow (−0.038, 0.078)$

95. In the article that was published in Vegetarian Today, the author wrote, "The 95% confidence level tells us that if the same survey were repeated 100 times, 95 times the same responses would be returned." Is this a correct interpretation of the 95% confidence level?
KEY: No

# Section 10.4

96. The following ranges are possible 95% confidence intervals for the percentage of Americans who think they work too many hours. For which one of the confidence intervals could you conclude that a majority of the population thinks they work too many hours?
    A. 41% to 49%
    B. 49% to 54%
    C. 42% to 51%
    D. 52% to 58%
KEY: D

**Questions 97 and 98:** In a past General Social Survey, 22% of $n = 1006$ respondents answered *yes* to the question "Are you a member of any sports groups?"  A 95% confidence interval for the population proportion of Americans who belonged to a sports group at that time is 19.4% to 24.6%.

97. Based on these results, you can reasonably conclude that
    A. less than 50% of all Americans belong to sports clubs.
    B. more than 50% of all Americans belong to sports clubs.
    C. 22% of all Americans belong to sports clubs.
    D. None of the above
KEY: A

98. Based on these results, you can reasonably conclude that
    A. 22% is an acceptable possibility for the proportion of all Americans belonging to sports clubs, but 20% is not.
    B. Neither 20% nor 22% are acceptable possibilities for the proportion of all Americans belonging to sports clubs.
    C. Both 20% and 22% are acceptable possibilities for the proportion of all Americans belonging to sports clubs.
    D. None of the above
KEY: C

99. In a past General Social Survey, a random sample of men and women answered the question "Are you a member of any sports groups?" Based on the sample data, 95% confidence intervals for the population proportion who would answer *yes* are 0.13 to 0.19 for women and 0.25 to 0.33 for men. Based on these results, you can reasonably conclude that
    A. at least 25% of American men and American women belong to sports clubs.
    B. there is no conclusive evidence of a gender difference in the proportions of men and women who belong to sports clubs.
    C. there is conclusive evidence of a gender difference in proportions of American men and American women who belong to sports clubs.
    D. None of the above
KEY: C

100. In a past General Social Survey, a random sample of respondents answered the question "Are you a member of any sports groups?" Based on the sample data, 95% confidence intervals for the population proportion who would answer *yes* are 0.215 to 0.365 for people 18 to 23 years old and 0.247 to 0.333 for people 24 to 29 years old. Based on these results, you can reasonably conclude that
   A. at least 40% of people aged 18 to 23 years old and people aged 24 to 29 years old belong to sports clubs.
   B. there is no conclusive evidence of a difference between the two age groups in the proportions of people belonging to sports clubs.
   C. there is conclusive evidence of a difference between the two age groups in the proportions of people belonging to sports clubs.
   D. None of the above
KEY: B

101. Suppose a 95% confidence interval for the proportion of Americans who exercise regularly is 0.29 to 0.37. Which one of the following statements is *false*?
   A. It is reasonable to say that more than 25% of Americans exercise regularly.
   B. It is reasonable to say that more than 40% of Americans exercise regularly.
   C. An acceptable hypothesis is that about 33% of Americans exercise regularly.
   D. It is reasonable to say that fewer than 40% of Americans exercise regularly.
KEY: B

102. A 95% confidence interval for the proportion of women that has ever dozed off while driving is 0.07 to 0.14. For men, a 95% confidence interval for the proportion that has ever dozed off while driving is 0.19 to 0.25. Assume both intervals were computed using large random samples. What conclusion can be made about the population proportions that have dozed off while driving?
   A. It is reasonable to conclude that there is a difference between men and women.
   B. It is not reasonable to conclude that there is a difference between men and women.
   C. It is reasonable to conclude that there is a difference of 0.05 between men and women.
   D. No conclusion is possible because we don't know the margin of error.
KEY: A

103. A CBS News poll taken in January 2010 asked a random sample of 1,090 adults in the US "Do you think the federal government is adequately prepared to deal with a major earthquake in the United States, or not?" A 95% confidence interval for the proportion of the population that thinks the government is prepared is .31 to .37. Based on this result, which one of the following statements is false?
   A. It is reasonable to say that a majority of adults in the US think the federal government is prepared to deal with a major earthquake.
   B. It is reasonable to say that fewer than half of adults in the US think the federal government is prepared to deal with a major earthquake.
   C. It is possible that approximately 35% of adults in the US think the federal government is prepared to deal with a major earthquake.
   D. A 99% confidence interval for the proportion of the population that thinks the government is prepared would be wider than the 95% confidence interval given above.
KEY: A

104. In a past General Social Survey, responses to the question "Have you ever been beaten or punched by another person" gave the following 95% confidence intervals for the population proportions of women and men who would say *yes* as 0.195 to 0.265 and 0.493 to 0.587, respectively. The sample sizes for men and women were large (444 men and 591 women). Is it reasonable to conclude that there is a difference in the population between men and women in the proportion that have ever been beaten or punched by another person?
KEY: Yes, because the two intervals do not overlap.