Ch08 - ch 8 prep questions

Analytical Methods for Business (University of Arizona)

ch08

Student: ____

1. A point estimate is a function of the random sample used to make inferences about the value of an unknown population parameter. A point estimator reflects the actual value of the point estimate derived from a given sample.
True False

2. An estimator is unbiased if its expected value equals the estimated population parameter.
True False

3. An unbiased estimator is efficient if its standard error is higher than that of other unbiased estimators of the estimated population parameter.
True False

4. An estimator is consistent if it approaches the estimated population parameter as the sample size grows larger.
True False

5. A confidence interval provides a value that, with a certain measure of confidence, is the population parameter of interest.
True False

6. For a given confidence level $100(1-\alpha)\%$ and sample size n, the width of the confidence interval for the population mean is narrower, the greater the population standard deviation σ.
True False

7. For a given confidence level $100(1-\alpha)\%$ and population standard deviation σ, the width of the confidence interval for the population mean is wider, the smaller the sample size n.
True False

8. For a given sample size n and population standard deviation σ, the width of the confidence interval for the population mean is wider, the smaller the confidence level $100(1-\alpha)\%$.
True False

9. If a random sample of size n is taken from a normal population with a finite variance, then the statistic $T = \frac{\bar{X}-\mu}{S/\sqrt{n}}$ follows the t distribution with (n - 1) degrees of freedom, df.
True False

10. Like the z distribution, the t distribution is symmetric around 0, bell-shaped, and with tails that approach the horizontal axis and eventually cross it.
True False

11. The t distribution has broader tails than the z distribution.
True False

12. The t distribution consists of a family of distributions where the actual shape of each one depends on the degrees of freedom, df. For lower values of df, the t distribution is similar to the z distribution.
True False

13. The required sample size for the interval estimation of the population mean can be computed if we specify the population standard deviation σ, the value of $z_{\alpha/2}$ based on the confidence level $100(1-\alpha)\%$, and the desired margin of error D.
True False

14. If we want to find the required sample size for the interval estimation of the population proportion, and no reasonable estimate of this proportion is available, we assume the worst-case scenario under which $\hat{p} = 0.5$.
True False

15. Which of the following is a point estimator?
A. $\bar{X}$
B. p
C. $\bar{x} = 12$
D. $\bar{p} = 0.25$

16. Which of the following is a point estimate?
A. $\bar{X}$
B. P
C. μ
D. $\bar{x} = 12$

17. How is the unbiasness of estimators defined?
A. An estimator is unbiased if its expected value equals the estimated population parameter.
B. An unbiased estimator approaches the estimated population parameter as the sample size grows larger.
C. An estimator is unbiased if it always gives the correct value of the estimated population parameter.
D. An estimator is unbiased if its standard error is lower than that of other estimators of the estimated population parameter.

18. How is the efficiency of estimators defined?
A. An estimator is efficient if its expected value equals the estimated population parameter.
B. An efficient estimator approaches the estimated population parameter as the sample size grows larger.
C. An estimator is efficient if it always gives the correct value of the estimated population parameter.
D. An unbiased estimator is efficient if its standard error is lower than that of other estimators of the estimated population parameter.

19. An estimator that tends to produce more accurate estimates of the population parameter as the sample size increases is best characterized as a(n) _____________.
A. Biased estimator
B. Efficient estimator
C. Unbiased estimator
D. Consistent estimator

20. How is the consistency of estimators defined?
A. An estimator is consistent if its expected value equals the estimated population parameter.
B. A consistent estimator approaches the estimated population parameter as the sample size grows larger.
C. An estimator is consistent if it always gives the correct value of the estimated population parameter.
D. An unbiased estimator is consistent if its standard error is lower than that of other estimators of the estimated population parameter.

21. How does an interval estimator differ from a point estimator?
A. A point estimator may produce very biased results, while an interval estimator never has such a feature.
B. If a point estimator fails to produce an unbiased result, then an interval estimator secures such a result.
C. An interval estimator provides a range of values that always include the estimated population parameter.
D. An interval estimator provides a range of values for the estimated population parameter rather than a single value provided by a point estimator.

22. What is the purpose of calculating a confidence interval?
    A. To provide a range of values that has a certain large probability of containing the sample statistic of interest
    B. To provide a range of values that, with a certain measure of confidence, contains the sample statistic of interest
    C. To provide a range of values that, with a certain measure of confidence, contains the population parameter of interest
    D. To provide a range of values that has a certain large probability of containing the population parameter of interest

23. What is the most typical form of a calculated confidence interval?
    A. Point estimate ± Standard error
    B. Point estimate ± Margin of error
    C. Population parameter ± Standard error
    D. Population parameter ± Margin of error

24. Which of the following is the necessary condition for creating confidence intervals for the population mean?
    A. Normality of the estimator
    B. Normality of the population
    C. Known population parameter
    D. Known standard deviation of the estimator

25. What is $z_{\alpha/2}$ for a 95% confidence interval of the population mean?
    A. 0.48
    B. 0.49
    C. 1.645
    D. 1.96

26. What is $z_{\alpha/2}$ for a 90% confidence interval of the population mean?
    A. 0.48
    B. 0.49
    C. 1.645
    D. 1.96

27. We draw a random sample of size 25 from the normal population with the variance 2.4. If the sample mean is 12.5, what is a 99% confidence interval for the population mean?
    A. [11.2600, 13.7400]
    B. [11.3835, 13.6165]
    C. [11.7019, 13.2981]
    D. [11.7793, 13.2207]

28. We draw a random sample of size 36 from a population with the standard deviation 3.5. If the sample mean is 27, what is a 95% confidence interval for the population mean?
    A. [25.8567, 28.1433]
    B. [26.0405, 27.9595]
    C. [26.8100, 27.1900]
    D. [26.8401, 27.1599]

29. In an examination of purchasing patterns of shoppers, a sample of 16 shoppers revealed that they spent, on average, $54 per hour of shopping. Based on previous years, the population standard deviation is thought to be $21 per hour of shopping. Assuming that the amount spent per hour of shopping is normally distributed, find a 90% confidence interval for the mean amount.
    A. [45.3637, 62.6363]
    B. [47.2695, 60.7305]
    C. [51.8409, 56.1591]
    D. [52.3174, 55.6826]

30. At a particular academically challenging high school, the average GPA of a high school senior is known to be normally distributed with a variance of 0.25. A sample of 20 seniors is taken and their average GPA is found to be 2.71. Develop a 90% confidence interval for the population mean GPA.
A. [2.5261, 2.8939]
B. [2.5667, 2.8533]
C. [2.6180, 2.8020]
D. [2.6384, 2.7816]

31. The daily revenue from the sale of fried dough at a local street vendor in Boston is known to be normally distributed with a known standard deviation of $120. The revenue on each of the last 25 days is noted, and the average is computed as $550. Construct a 95% confidence interval for the population mean of the sale of fried dough by this vendor.
A. $120 \pm 1.645(550/5)$
B. $120 \pm 1.96(550/5)$
C. $550 \pm 1.645(120/5)$
D. $550 \pm 1.96(120/5)$

32. **Exhibit 8.1.** The ages of MBA students at a university are normally distributed with a known population variance of 10.24. Suppose you are asked to construct a 95% confidence interval for the population mean age if the mean of a sample of 36 students is 26.5 years.

Refer to Exhibit 8.1. What is the margin of error for a 95% confidence interval for the population mean?

A. 1.645(3.20/6)
B. 1.645(10.24/6)
C. 1.96(3.20/6)
D. 1.96(10.24/6)

33. **Exhibit 8.1.** The ages of MBA students at a university are normally distributed with a known population variance of 10.24. Suppose you are asked to construct a 95% confidence interval for the population mean age if the mean of a sample of 36 students is 26.5 years.

Refer to Exhibit 8.1. If a 99% confidence interval is constructed instead of a 95% confidence interval for the population mean, then _____________.
A. The resulting margin of error will increase and the risk of reporting an incorrect interval will increase
B. The resulting margin of error will decrease and the risk of reporting an incorrect interval will increase
C. The resulting margin of error will increase and the risk of reporting an incorrect interval will decrease
D. The resulting margin of error will decrease and the risk of reporting an incorrect interval will decrease

34. An analyst takes a random sample of 25 firms in the telecommunications industry and constructs a confidence interval for the mean return for the prior year. Holding all else constant, if he increased the sample size to 30 firms, how are the standard error of the mean and the width of the confidence interval affected?

	Standard error of the mean	Width of confidence interval
A.	Increases	Becomes wider
B.	Increases	Becomes narrower
C.	Decreases	Becomes wider
D.	Decreases	Becomes narrower

A. Option A
B. Option B
C. Option C
D. Option D

35. The daily revenue from the sale of fried dough at a local street vendor in Boston is known to be normally distributed with a known standard deviation of $120. The revenue on each of the last 25 days is noted, and the average is computed as $550. A 95% confidence interval is constructed for the population mean revenue. If the data from the last 40 days had been used, then the resulting 95% confidence intervals would have been ____________________.
A. Wider, with a larger probability of reporting an incorrect interval
B. Wider, with the same probability of reporting an incorrect interval
C. Narrower, with a larger probability of reporting an incorrect interval
D. Narrower, with the same probability of reporting an incorrect interval

36. A sample of a given size is used to construct a 95% confidence interval for the population mean with a known population standard deviation. If a bigger sample had been used instead, then the 95% confidence interval would have been _______and the probability of making an error would have been ________.

A. Wider, smaller
B. Narrower, smaller
C. Wider, unchanged
D. Narrower, unchanged

37. For a given confidence level and sample size, which of the following is true in the interval estimation of the population mean when σ is known?
A. If the sample standard deviation is smaller, the interval is wider.
B. If the population standard deviation is greater, the interval is wider.
C. If the population standard deviation is smaller, the interval is wider.
D. If the population standard deviation is greater, the interval is narrower.

38. For a given confidence level and population standard deviation, which of the following is true in the interval estimation of the population mean?
A. If the sample size is greater, the interval is narrower.
B. If the sample size is smaller, the interval is narrower.
C. If the population size is greater, the interval is narrower.
D. If the population size is smaller, the interval is narrower.

39. For a given sample size and population standard deviation, which of the following is true in the interval estimation of the population mean?
A. If the confidence level is greater, the interval is wider.
B. If the confidence level is smaller, the interval is wider.
C. If the confidence level is greater, the interval is narrower.
D. No answer choices are correct.

40. A 90% confidence interval is constructed for the population mean. If a 95% confidence interval had been constructed instead (everything else remaining the same), the width of the interval would have been ________ and the probability of making an error would have been _________.
A. Wider; bigger
B. Wider; smaller
C. Narrower; bigger
D. Narrower; smaller

41. Suppose taxi fare from Logan Airport to downtown Boston is known to be normally distributed with a standard deviation of $2.50. The last seven times John has taken a taxi from Logan to downtown Boston the fares have been $22.10, $23.25, $21.35, $24.50, $21.90, $20.75, and $22.65. What is a 95% confidence interval for the population mean taxi fare?
A. [$17.4571, $27.2571]
B. [$20.5051, $24.2091]
C. [$20.8027, $23.9115]
D. [$21.6571, $23.0571]

42. A website advertises job openings on its website, but job seekers have to pay to access the list of job openings. The website recently completed a survey to estimate the number of days it takes to find a new job using their service. It took the last 30 customers an average of 60 days to find a job. Assume the population standard deviation is 10 days. Calculate a 95% confidence interval of the population mean number of days it takes to find a job.
A. [40.4000, 79.6000]
B. [55.9085, 64.0915]
C. [56.4215, 63.5785]
D. [56.9966, 63.0034]

43. The t distribution is similar to the z distribution because ________________.
A. As the degrees of freedom go to infinity, the t distribution converges to the z distribution
B. Both have asymptotic tails—that is, their tails become closer and closer to the horizontal axis, but never touch it
C. Both A and B are correct
D. Neither A nor B is correct

44. How do the t and z distributions differ?
A. There is no difference between the t and z distributions.
B. The z distribution has broader tails (it is flatter around zero).
C. The t distribution has broader tails (it is flatter around zero).
D. The z distribution has asymptotic tails, while the t distribution does not.

45. What is $t_{\alpha/2,df}$ for a 95% confidence interval of the population mean based on a sample of 15 observations?
A. 1.761
B. 1.960
C. 2.131
D. 2.145

46. What is $t_{\alpha/2,df}$ for a 99% confidence interval of the population mean based on a sample of 25 observations?
A. 2.492
B. 2.576
C. 2.787
D. 2.797

47. Confidence intervals of the population mean may be created for the cases when the population standard deviation is known or unknown. How are these two cases treated differently?
A. Use the z table when s is unknown; use the t table when s is known.
B. Use the z table when s is known; use the t table when s is unknown.
C. Use the z table when σ is unknown; use the t table when σ is known.
D. Use the z table when σ is known; use the t table when σ is unknown.

48. What conditions are required by the central limit theorem before a confidence interval of the population mean may be created?
A. The underlying population must be normally distributed.
B. The underlying population must be normally distributed if the sample size is 30 or more.
C. The underlying population need not be normally distributed if the sample size is 30 or more.
D. The underlying population need not be normally distributed if the population standard deviation is known.

49. The GPA of accounting students in a university is known to be normally distributed. A random sample of 20 accounting students results in a mean of 2.92 and a standard deviation of 0.16. Construct the 95% confidence interval for the mean GPA of all accounting students at this university.
A. $2.92 \pm 1.729(0.16/\sqrt{20})$
B. $2.92 \pm 1.96(0.16/\sqrt{20})$
C. $2.92 \pm 2.086(0.16/\sqrt{20})$
D. $2.92 \pm 2.093(0.16/\sqrt{20})$

50. The starting salary of business students in a university is known to be normally distributed. A random sample of 18 business students results in a mean salary of $46,500 with a standard deviation of $10,200. Construct the 90% confidence interval for the mean starting salary of business students in this university.

A.

B.

C. $46,500 \pm 1.734(10,200/\sqrt{18})$
D. $46,500 \pm 1.740(10,200/\sqrt{18})$

51. Given a sample mean of 27 and a sample standard deviation of 3.5 computed from a sample of size 36, find a 95% confidence interval on the population mean.
A. [25.8158, 28.1842]
B. [25.8170, 28.1830]
C. [26.0142, 27.9858]
D. [26.9930, 27.0070]

52. Given a sample mean of 12.5—drawn from a normal population, a sample of size 25, and a sample variance of 2.4—find a 99% confidence interval for the population mean.
A. [11.7019, 13.2981]
B. [11.1574, 13.8426]
C. [11.6334, 13.3666]
D. [11.7279, 13.2721]

53. At a particular academically challenging high school, the average GPA of a high school senior is known to be normally distributed. After a sample of 20 seniors is taken, the average GPA is found to be 2.71 and the variance is determined to be 0.25. Find a 90% confidence interval for the population mean GPA.
A. [2.5167, 2.9033]
B. [2.5261, 2.3939]
C. [2.5615, 2.8585]
D. [2.6358, 2.7842]

54. In an examination of holiday spending (known to be normally distributed) of a sample of 16 holiday shoppers at a local mall, an average of $54 was spent per hour of shopping. Based on the current sample, the standard deviation is equal to $21. Find a 90% confidence interval for the population mean level of spending per hour.
A. [$44.8335, $63.1665]
B. [$44.7967, $63.2033]
C. [$45.3637, $62.6363]
D. [$46.9597, $61.0403]

55. **Exhibit 8-2.** The mortgage foreclosure crisis that preceded the Great Recession impacted the U.S. economy in many ways, but it also impacted the foreclosure process itself as community activists better learned how to delay foreclosure, and lenders became more wary of filing faulty documentation. Suppose the duration of the eight most recent foreclosures filed in the city of Boston (from the beginning of foreclosure proceedings to the filing of the foreclosure deed, transferring the property) has been 230 days, 420 days, 340 days, 367 days, 295 days, 314 days, 385 days, and 311 days. Assume the duration is normally distributed.

    Refer to Exhibit 8-2. Construct a 99% confidence interval for the mean duration of the foreclosure process in Boston.
    A. [126.2730, 539.2270]
    B. [259.7486, 405.7514]
    C. [279.0056, 386.4944]
    D. [291.8600, 373.6400]

56. **Exhibit 8-2.** The mortgage foreclosure crisis that preceded the Great Recession impacted the U.S. economy in many ways, but it also impacted the foreclosure process itself as community activists better learned how to delay foreclosure, and lenders became more wary of filing faulty documentation. Suppose the duration of the eight most recent foreclosures filed in the city of Boston (from the beginning of foreclosure proceedings to the filing of the foreclosure deed, transferring the property) has been 230 days, 420 days, 340 days, 367 days, 295 days, 314 days, 385 days, and 311 days. Assume the duration is normally distributed.

    Refer to Exhibit 8-2. Construct a 90% confidence interval for the mean duration of the foreclosure process in Boston.
    A. [259.7400, 405.7600]
    B. [293.2137, 372.2863]
    C. [298.4296, 367.0704]
    D. [303.2282, 362.2718]

57. A company that produces computers recently tested the battery in its latest laptop in six separate trials. The battery lasted 8.23, 7.89, 8.14, 8.25, 8.30, and 7.95 hours before burning out in each of the tests. Assuming the battery duration is normally distributed, construct a 95% confidence interval for the mean battery life in the new model.
    A. [7.9489, 8.3045]
    B. [7.9575, 8.2959]
    C. [7.9873, 8.2661]
    D. [7.9912, 8.2622]

58. **Exhibit 8-3.** Professors of Accountancy are in high demand at American universities. A random sample of 28 new accounting professors found the average salary was 135 thousand dollars with a standard deviation of 16 thousand dollars. Assume the distribution is normally distributed.

    Refer to Exhibit 8-3. Construct a 95% confidence interval for the salary of new accounting professors. Answers are in thousands of dollars.
    A. [102.1680, 167.832]
    B. [127.8247, 142.1753]
    C. [128.7953, 141.2047]
    D. [129.0735, 140.9265]

59. **Exhibit 8-3.** Professors of Accountancy are in high demand at American universities. A random sample of 28 new accounting professors found the average salary was 135 thousand dollars with a standard deviation of 16 thousand dollars. Assume the distribution is normally distributed.

Refer to Exhibit 8-3. Construct a 90% confidence interval for the salary of new accounting professors. Answers are in thousands of dollars.
A. [107.7520, 162.2480]
B. [129.8506, 140.1494]
C. [130.0260, 139.9740]
D. [131.0268, 138.9732]

60. A basketball coach wants to know how many free throws an NBA player shoots during the course of an average practice. The coach takes a random sample of 43 players and finds the average number of free throws shot per practice was 225 with a standard deviation of 35. Construct a 99% confidence interval for the average number of free throws in practice.
A. [210.5995, 239.4005]
B. [210.6155, 239.3845]
C. [211.2506, 238.7494]
D. [214.2290, 235.7710]

61. The confidence intervals for the population proportion are generally based on ___________.
A. The z distribution
B. The t distribution
C. The z distribution when the sample size is very small
D. The t distribution when the population standard deviation is not known

62. When examining the possible outcome of an election, what type of confidence interval is most suitable for estimating the current support for a candidate?
A. The confidence interval for the sample mean
B. The confidence interval for the population mean
C. The confidence interval for the sample proportion
D. The confidence interval for the population proportion

63. Which of the following is the correct formula for the margin of error in the interval estimation of p?
A. $z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}}$
B. $z_{\alpha/2}\sqrt{\frac{\overline{p}(1-\overline{p})}{n}}$
C. $z_{\alpha/2}\sqrt{\frac{p(1-p)}{n-1}}$
D. $z_{\alpha/2}\sqrt{\frac{\overline{p}(1-\overline{p})}{n-1}}$

64. The sampling distribution of the population proportion is based on a binomial distribution. What condition must be met to use the normal approximation for the confidence interval?
A. n ≥ 30
B. $n\overline{p} \geq 5$
C. $n\overline{p} \geq 5$ and $n(1-\overline{p}) \geq 5$
D. $np \geq 5$ and $n(1-p) \geq 5$

65. **Exhibit 8.4.** According to a report in USA Today (February 1, 2012), more and more parents are helping their young adult children get homes. Suppose 8 persons in a random sample of 40 young adults who recently purchased a home in Kentucky got help from their parents. You have been asked to construct a 95% confidence interval for the population proportion of all young adults in Kentucky who got help from their parents.

    Refer to Exhibit 8.4. What is the margin of error for a 95% confidence interval for the population proportion?
    A. 1.645(0.0040)
    B. 1.645(0.0632)
    C. 1.96(0.0040)
    D. 1.96(0.0632)

66. **Exhibit 8.4.** According to a report in USA Today (February 1, 2012), more and more parents are helping their young adult children get homes. Suppose 8 persons in a random sample of 40 young adults who recently purchased a home in Kentucky got help from their parents. You have been asked to construct a 95% confidence interval for the population proportion of all young adults in Kentucky who got help from their parents.

    Refer to Exhibit 8.4. If a 99% confidence interval is constructed instead of a 95% confidence interval for the population proportion, then ____________________.
    A. The resulting margin of error will increase and the risk of reporting an incorrect interval will increase
    B. The resulting margin of error will decrease and the risk of reporting an incorrect interval will increase
    C. The resulting margin of error will increase and the risk of reporting an incorrect interval will decrease
    D. The resulting margin of error will decrease and the risk of reporting an incorrect interval will decrease

67. Construct a 95% confidence interval on the population proportion for the support of candidate A in the following mayoral election. Candidate A is facing two opposing candidates in a mayoral election. In a recent poll of 300 residents, she has garnered 51% support.
    A. [0.4534, 0.5666]
    B. [0.4625, 0.5575]
    C. [0.5084, 0.5116]
    D. [0.5086, 0.5114]

68. Construct a 90% confidence interval on the population proportion for the support of candidate A in the following mayoral election. Candidate A is facing two opposing candidates. In a recent poll of 300 residents, 153 supported her.
    A. [0.4534, 0.5666]
    B. [0.4625, 0.5575]
    C. [0.5086, 0.5114]
    D. [0.5090, 0.5110]

69. Construct a 99% confidence interval on the population proportion for the support of candidate A in the following mayoral election. Candidate A is facing two opposing candidates. In a recent poll of 300 residents, 98 supported candidate B and 58 supported candidate C.
    A. [0.4057, 0.5543]
    B. [0.4130, 0.5470]
    C. [0.4779, 0.4821]
    D. [0.4781, 0.4819]

70. **Exhibit 8-5.** A sample of 2,007 American adults was asked how they viewed China, with 17% of respondents indicating "unfriendly" and 6% of respondents indicating "an enemy" (Gallup, Nov. 30 - Dec. 18, 2011).

Refer to Exhibit 8-5. Construct a 95% confidence interval of the proportion of American adults who view China as either "unfriendly" or as "an enemy."
A. [0.2013, 0.2587]
B. [0.2116, 0.2484]
C. [0.2146, 0.2454]
D. [0.2208, 0.2392]

71. **Exhibit 8-5.** A sample of 2,007 American adults was asked how they viewed China, with 17% of respondents indicating "unfriendly" and 6% of respondents indicating "an enemy" (Gallup, Nov. 30 - Dec. 18, 2011).

Refer to Exhibit 8-5. Construct a 99% confidence interval of the proportion of American adults who view China as "an enemy."
A. [0.0463, 0.0737]
B. [0.0476, 0.0724]
C. [0.0512, 0.0688]
D. [0.0597, 0.0603]

72. **Exhibit 8-6.** A sample of 1400 American households was asked if they planned to buy a new car next year. Of the respondents, 34% indicated they planned to buy a new car next year.

Refer to Exhibit 8-6. Construct a 98% confidence interval of the proportion of American households who expect to buy a new car next year.
A. [0.3074, 0.3726]
B. [0.3105, 0.3695]
C. [0.3140, 0.3660]
D. [0.3392, 0.3408]

73. **Exhibit 8-6.** A sample of 1400 American households was asked if they planned to buy a new car next year. Of the respondents, 34% indicated they planned to buy a new car next year.

Refer to Exhibit 8-6. Construct a 90% confidence interval of the proportion of American households who expect to buy a new car next year.
A. [0.3152, 0.3648]
B. [0.3191, 0.3609]
C. [0.3394, 0.3406]
D. [0.3354, 0.3446]

74. Statisticians like precision in their interval estimates. A low margin of error is needed to achieve this. Which of the following supports this when selecting sample sizes?
A. A larger sample size reduces the margin of error.
B. A smaller sample size reduces the margin of error.
C. A larger sample size increases the margin of error.
D. A sample size has no impact on the margin of error.

75. When the required sample size calculated by using a formula is not a whole number, what is the best choice for the required sample size?
A. Round the result of the calculation in a standard way.
B. Round the result of the calculation up to the nearest whole number.
C. Round the result of the calculation down to the nearest whole number.
D. None of the above.

76. What is the minimum sample size required to estimate a population mean with 95% confidence when the desired margin of error is D = 1.5? The population standard deviation is known to be 10.75.
A. n = 138
B. n = 139
C. n = 197
D. n = 198

77. What is the minimum sample size required to estimate a population mean with 90% confidence when the desired margin of error is D = 1.25? The standard deviation in a preselected sample is 8.5.
A. n = 76
B. n = 125
C. n = 126
D. n = 190

78. The minimum sample size n required to estimate a population mean with 95% confidence and the desired margin of error 1.5 was found to be 198. Which of the following is the approximate value of the assumed estimate of the population standard deviation?
A. 10.7688
B. 12.8309
C. 115.9671
D. 164.6326

79. The minimum sample size n required to estimate a population mean with 95% confidence and the assumed estimate of the population standard deviation 6.5 was found to be 124. Which of the following is the approximate value of the assumed desired margin of error?
A. D = 0.9220
B. D = 0.9602
C. D = 1.1441
D. D = 1.3090

80. A marketing firm wants to estimate how much root beer the average teenager drinks per year. A previous study found a standard deviation of 1.12 liters. How many teenagers must the firm interview in order to have a margin of error of at most 0.1 liters when constructing a 99% confidence interval?
A. 29
B. 832
C. 832.39
D. 833

81. A medical devices company wants to know the number of hours their MRI machines are used per day. A previous study found a standard deviation of four hours. How many MRI machines must the company find data for in order to have a margin of error of at most 0.5 hours when calculating a 98% confidence interval?
A. 346.26
B. 347
C. 424.69
D. 425

82. Suppose we wish to find the required sample size to find a 90% confidence interval for the population proportion with the desired margin of error. If there is no rough estimate $\hat{p}$ of the population proportion, what value should be assumed for $\hat{p}$?
A. 0.05
B. 0.10
C. 0.50
D. 0.90

83. Find the minimum sample size when we want to construct a 90% confidence interval on the population proportion for the support of candidate A in the following mayoral election. Candidate A is facing two opposing candidates. In a preselected poll of 100 residents, 22 supported her. The desired margin of error is 0.08.
A. n = 44
B. n = 72
C. n = 73
D. n = 103

84. Find the minimum sample size when we want to construct a 95% confidence interval on the population proportion for the support of candidate A in the following mayoral election. Candidate A is facing two opposing candidates. In a preselected poll of 100 residents, 22 supported candidate B and 14 supported candidate C. The desired margin of error is 0.06.
A. n = 173
B. n = 174
C. n = 245
D. n = 246

85. According to a report in USA Today (February 1, 2012), more and more parents are helping their young adult children buy homes. You would like to construct a 90% confidence interval of the proportion of all young adults in Louisville, Kentucky, who got help from their parents in buying a home. How large a sample should you take so that the margin of error is no more than 0.06?
A. n = 114
B. n = 188
C. n = 267
D. Cannot be determined

86. The minimum sample size n required to estimate a population proportion, with 95% confidence and the assumed most conservative $\hat{p}$ = 0.5, was found to be 122. Which of the following is the approximate value of the assumed desired margin of error?
A. D = 0.0055
B. D = 0.0078
C. D = 0.0745
D. D = 0.0887

87. A researcher in campaign finance law wants to estimate the proportion of elementary, middle, and high school teachers who contributed to a candidate during a recent election cycle. Given that no prior estimate of the population proportion is available, what is the minimum sample size such that the margin of error is no more than 0.03 for a 95% confidence interval?
A. 751.67
B. 752
C. 1067.11
D. 1068

88. A politician wants to estimate the percentage of people who like his new slogan. Given that no prior estimate of the population proportion is available, what is the minimum sample size such that the margin of error is no more than 0.08 for a 95% confidence interval?
A. 105.70
B. 106
C. 150.06
D. 151

89. The snowfall (in inches) during the month of January in a particular geographic region is normally distributed with a standard deviation of 16.75. In the last 12 years, the sample average of snowfall is computed as 122.50.

a. Construct a 90% confidence interval of the average snowfall in this region.
b. Construct a 95% confidence interval of the average snowfall in this region.
c. Comment on the width of the preceding confidence intervals.

90. The height of high school basketball players is known to be normally distributed with a standard deviation of 1.75 inches. In a random sample of eight high school basketball players, the height (in inches) is recorded as 75, 82, 68, 74, 78, 70, 77, and 76. Construct a 95% confidence interval on the average height of all high school basketball players.

91. Each portion of the SAT exam is designed to be normally distributed such that it has a population standard deviation of 100 and a mean of 500. However, the mean has changed over the years as less selective schools began requiring the SAT, and because students later began to prepare more specifically for the exam. Construct a 90% confidence interval for the population mean from the following eight scores from the math portion, using the population standard deviation of 100: 450, 660, 760, 540, 420, 430, 640, and 580.

92. In order to estimate the mean earnings forecast for a large company, an investor looked up earnings forecasts from six financial analysts. The six forecasts he found were 200, 220, 300, 185, 210, and 210 (in millions). Suppose the investor knows the population standard deviation is 25 million. Calculate a 95% confidence interval of the population mean earnings forecast.

93. A sample of holiday shoppers is taken randomly from a local mall. Forty-nine shoppers were selected and asked what their average spending on gifts would be during the entire holiday season. The point estimate of the population mean was calculated as $550 and the sample standard deviation was calculated as $92.

a. Construct a 95% confidence interval of the population mean spending.
b. Explain how the central limit theorem is used in constructing this interval.

94. Pure-bred dogs competing in shows must often meet specific height criteria to be within the breed standard. A new breed of dog, the pug-cock-a-poo, has been approved by a kennel club. In order to establish the breed standard, the organization of breeders has taken the height from a sample of 25 pug-cock-a-poos and found the sample mean to equal 14 inches. The variance of this sample is 2.25.

a. Construct a 90% confidence interval for the population mean height of the pug-cock-a-poos.
b. What assumption is necessary for constructing the above interval?

95. A sample of the weights of 35 babies is taken from the local hospital maternity ward. The point estimate for the mean weight of the babies is 110.2 ounces with a sample standard deviation of 23.4 ounces. Construct a 90% confidence interval for the population mean baby weight at this hospital. Interpret this interval.

96. The personnel department of a large corporation wants to estimate the family dental expenses of its employees to determine the feasibility of providing a dental insurance plan. A random sample of six employees reveals the following family dental expenses: $180, $260, $60, $40, $100, and $80. It is known that dental expenses follow a normal distribution. Construct a 90% confidence interval for the average family dental expenses for all employees of this corporation.

97. A job candidate with an offer from a prominent investment bank wanted to estimate how many hours she would have to work per week during her first year at the bank. She took a sample of six first-year analysts, asking how many hours they worked in the last week. Construct a 95% confidence interval with her results: 64, 82, 74, 73, 78, and 87 hours.

98. Bobby does not want to be late to work again. He drives to work every morning from Oakland to San Francisco and crossing the Bay Bridge seems to take forever. He times himself crossing the bridge for seven consecutive mornings, with the resulting times: 22.34, 27.54, 15.26, 13.56, 18.57, 21.22, and 19.08 minutes. Construct a 99% confidence interval from those times.

99. A string quartet in Maui wants to better understand their income stream, which primarily comes from playing at weddings. The cellist records the number of weddings they play in six successive months. Construct a 90% confidence interval from her results: 3, 5, 7, 4, 4, and 5.

100. A medical engineering company creates x-ray machines. The machines the company sold in 1995 were expected to last six years before breaking. To test how long the machines actually lasted, the company took a simple random sample of six machines. The company got the following results (in years) for how long the x-ray machines lasted: 8, 6, 7, 9, 5, and 7. Assume the distribution of the longevity of x-ray machines is normally distributed. Construct a 98% confidence interval for the average longevity of x-ray machines.

101. An environmentalist is measuring the number of spotted leopard lizards in central California per acre. The environmentalist surveys six acres and finds signs of 24, 26, 30, 27, 28, and 27 lizards per acre. Construct a 95% confidence interval for the average number of leopard lizards per acre.

102. A company manager thinks he is overpaying for fertilizer at $174 per ton. To find out, he collects fertilizer prices per ton from five distributors. Construct a 90% confidence interval from his results: 128, 140, 170, 166, and 156.

103. A large university is interested in the outcome of a course standardization process. They have taken a random sample of 100 student grades, across all instructors. The grades represent the proportion of problems answered correctly on a midterm exam. The sample proportion correct was calculated as 0.78.

a. Construct a 90% confidence interval on the population proportion of correctly answered problems.
b. Construct a 95% confidence interval on the population proportion of correctly answered problems.

104. A large university is interested in the outcome of a course standardization process. They have learned that 150 students of the total 1,500 students failed to pass the course in the current semester. Construct a 99% confidence interval on the population proportion of students who failed to pass the course. Was the normality condition met for the validity of the confidence interval formula?

105. A large city recently surveyed 1,354 street lights, finding that 4.2% of them had burned out. Construct a 99% confidence interval for the proportion of the city's street lights that are burned out.

106. A recent survey of 1,014 American adults found that 46% view environmental conditions as either "excellent" or "good" (Gallup, March 4-7, 2010). Construct a 95% confidence interval of the population proportion.

107. A large earthquake hit a city in South America. A survey of 2,000 houses found that 600 of them had collapsed. Construct a 95% confidence interval for the proportion of collapsed houses.

108. A student interviewing at a major company wants to know his chances of getting a job offer. He surveyed 18 alumni that had interviewed with the company and found 9 of them had received a job offer. Construct a 90% confidence interval for the population proportion.

109. Pure-bred dogs competing in shows must often meet specific height criteria to be considered to be within the breed standard. A new breed of dog, the pug-cock-a-poo, has been approved by a kennel club. The variance of pug-cock-a-poo height is known to be 2.25 inches squared.
You would like to estimate the mean height of all pug-cock-a-poo breeds of dogs.

a. Find the appropriate sample size to achieve a margin of error of 0.3 when maintaining a 90% level of confidence.
b. Find the appropriate sample size to achieve a margin of error of 0.3 when maintaining a 95% level of confidence.

110. A sample of holiday shoppers is taken randomly from a local mall to determine the average daily spending on gifts. From a preselected sample, the standard deviation was determined to be $26. You would like to construct a 95% confidence interval for the mean daily spending on all holiday spending.

a. Find the appropriate sample size necessary to achieve a margin of error of $5.
b. Find the appropriate sample size necessary to achieve a margin of error of $8.

111. The Department of Education wishes to estimate average SAT score among U.S. high school students. How many students would they have to sample, given that the test has a known population standard deviation of 100, in order to ensure that the margin of error was no more than 20 for a 99% confidence interval?

112. A financial analyst would like to construct a 95% confidence interval for the mean earnings of a company. The company's earnings have a standard deviation of 12 million. What is the minimum sample size required by the analyst if he wants to restrict the margin of error to 2 million?

113. Newscasters wish to predict the outcome of the next presidential election with 95% confidence and a margin of error equal to 0.08. Find the appropriate sample size to accomplish this goal.

114. Newscasters wish to predict the outcome of the next presidential election with 99% confidence and a margin of error equal to 0.08. Find the appropriate sample size to accomplish this goal.

115. A budget airline wants to estimate what proportion of customers would pay $10 for in-flight wireless access. Given that the airline has no prior knowledge of the proportion, how many customers would it have to sample to ensure a margin of error of no more than 5 percent for a 95% confidence interval?

116. A car dealership wants to estimate the percentage of customers that are satisfied with their customer service. Given that the car dealership has no prior knowledge of the proportion, how many customers would it have to sample to ensure a margin of error of no more than 5 percent for a 99% confidence interval?

ch08 Key

1. FALSE
2. TRUE
3. FALSE
4. TRUE
5. FALSE
6. FALSE
7. TRUE
8. FALSE
9. TRUE
10. FALSE
11. TRUE
12. FALSE
13. TRUE
14. TRUE
15. A
16. D
17. A
18. D
19. D
20. B
21. D
22. C
23. B
24. A
25. D
26. C
27. C
28. A
29. A
30. A
31. D
32. C
33. C
34. D
35. D
36. D

37. B
38. A
39. A
40. B
41. B
42. C
43. C
44. C
45. D
46. D
47. D
48. C
49. D
50. D
51. A
52. C
53. A
54. B
55. B
56. B
57. A
58. C
59. B
60. A
61. A
62. D
63. B
64. C
65. D
66. C
67. A
68. B
69. A
70. B
71. A
72. B
73. B
74. A

75. B

76. D

77. C

78. A

79. C

80. D

81. B

82. C

83. C

84. D

85. B

86. D

87. D

88. D

b. $$\bar{x} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 122.50 \pm 1.96\left(\frac{16.75}{3.4641}\right) = 122.50 \pm 9.4772 = [113.0228, 131.9772]$$

a. $$\bar{x} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 122.50 \pm 1.645\left(\frac{16.75}{3.4641}\right) = 122.50 \pm 7.9541 = [114.5459, 130.4541]$$

Feedback: Since the population standard deviation is known, we construct the confidence interval as:

89. [114.55459, 130.4541]; [113.0228, 131.9772]; the 95% interval is wider.

Feedback: $\bar{x} = \frac{\sum x_i}{n} = \frac{600}{8} = 75$. Since the population standard deviation is known, we construct the confidence interval as: $\bar{x} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 75 \pm 1.96\left(\frac{1.75}{2.8284}\right) = 75 \pm 1.2127 = [73.7879, 76.2127]$.

90. [73.7873, 76.2127]; 95% of intervals created this way from samples of size 8 would contain the population mean height.

$$\bar{x} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 560 \pm 1.645\left(\frac{100}{2.8284}\right) = 560 \pm 58.1601 = [501.8399, 618.1601]$$.

Feedback: $\bar{x} = \frac{\sum x_i}{n} = \frac{4480}{8} = 560$. Since the population standard deviation is known, we construct the confidence interval as:

91. [501.8399, 618.1601]

$$\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}} = 220.8333 \pm 1.96\left(\frac{25}{2.4495}\right) = 220.8333 \pm 20.0041 = [200.8292, 240.8374]$$
.

Feedback: $\bar{x} = \frac{\sum x_i}{n} = \frac{1325}{6} = 220.8333$. Since the population standard deviation is known, we construct the confidence interval as:

92. [200.8292, 240.8374]

a. $\bar{x} \pm t_{\alpha/2,n-1} \frac{s}{\sqrt{n}} = 550 \pm 2.011\left(\frac{92}{7}\right) = 550 \pm 26.4303 = [523.5697, 576.4303]$.

Feedback: Since the population standard deviation is unknown, we use the t distribution with $df = n-1 = 48$ to construct the confidence interval as:

93. [523.5697, 576.4303]. The condition that $\bar{X}$ is normally distributed is satisfied since the sample size $n = 49 > 30$ (central limit theorem).

b. Since the sample size $n = 25 < 30$, we must assume that the height of all dogs of the pug-cock-a-poo new breed is normally distributed.

a. $\bar{x} \pm t_{\alpha/2,n-1} \frac{s}{\sqrt{n}} = 14 \pm 1.711\left(\frac{\sqrt{2.25}}{\sqrt{25}}\right) = 14 \pm 0.5133 = [13.4867, 14.5133]$

Feedback: Since the population standard deviation is known, we use the t distribution with $df = n-1 = 24$ to construct the confidence interval.

94. [13.4867, 14.5133]. Since the sample size is less than 30, we must assume that the underlying population is normally distributed.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n-1 = 35$ to construct the confidence interval as $\bar{x} \pm t_{\alpha/2,n-1} \frac{s}{\sqrt{n}} = 110.20 \pm 1.691\left(\frac{23.4}{5.9161}\right) = 110.2 \pm 6.6884 = [103.5116, 116.8884]$.

95. [103.5116, 116.8884]; 90% of similarly constructed intervals of size 35 would contain the population mean weight of babies in this hospital.

$$\bar{x} \pm t_{\alpha/2,n-1} \frac{s}{\sqrt{n}} = 120 \pm 2.015\left(\frac{83.90}{2.4495}\right) = 120 \pm 69.0214 = [50.9786, 189.0214]$$
.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n-1 = 35$ to construct the co[illegible]n and sample standard deviation as $\bar{x} = \frac{\sum x_i}{n} = \frac{720}{6} = 120$ and $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{7040} = 83.9047$. The 90% confidence interval is

96. [50.9786, 189.0214]

$$\bar{x} \pm z_{\alpha/2}\frac{\sigma}{\sqrt{n}} = 220.8333 \pm 1.96\left(\frac{25}{2.4495}\right) = 220.8333 \pm 20.0041 = [200.8292, 240.8374]$$
.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n - 1 = 5$ to construct the confid … ample standard deviation as $\bar{x} = \frac{\sum x_i}{n} = \frac{458}{6} = 76.3333$ and $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{63.4667} = 7.9666$. The 95% confidence interval is

97. [67.9715, 84.6951]

$$\bar{x} \pm t_{\alpha/2,df}\frac{s}{\sqrt{n}} = 19.6529 \pm 3.707\left(\frac{4.6512}{2.6458}\right) = 19.65 \pm 6.5167 = [13.1362, 26.1696]$$
.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n - 1 = 6$ to construct the confid … sample standard deviation as $\bar{x} = \frac{\sum x_i}{n} = \frac{137.57}{7} = 19.6529$ and $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{21.6341} = 4.6512$. The 99% confidence interval is

98. [13.1362, 26.1696]

$$\bar{x} \pm t_{\alpha/2,df}\frac{s}{\sqrt{n}} = 4.6667 \pm 2.015\left(\frac{1.3663}{2.4495}\right) = 4.6667 \pm 1.1239 = [3.5428, 5.7906]$$
.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n - 1 = 5$ to construct the co … and sample standard deviation as $\bar{x} = \frac{\sum x_i}{n} = \frac{28}{6} = 4.6667$ and $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{1.8667} = 1.3663$. The 90% confidence interval is

99. [3.5428, 5.7906]

$$\bar{x} \pm t_{\alpha/2,df}\frac{s}{\sqrt{n}} = 7 \pm 3.365\left(\frac{1.4142}{2.4495}\right) = 7 \pm 1.9428 = [5.0572, 8.9428]$$
.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n - 1 = 5$ to construct the co … le mean and sample standard deviation as $\bar{x} = \frac{\sum x_i}{n} = \frac{42}{6} = 7$ and $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{2} = 1.4142$. The 98% confidence interval is

100. [5.0572, 8.9428]

$$\bar{x} \pm t_{\alpha/2,df} \frac{s}{\sqrt{n}} = 27 \pm 2.571\left(\frac{2}{2.4495}\right) = 27 \pm 2.0992 = [24.9008, 29.0992]$$.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n-1 = 5$ to construct the confidence interval. We first calculate the sample mean and sample standard deviation as $\bar{x} = \frac{\sum x_i}{n} = \frac{162}{6} = 27$ and $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{4} = 2$. The 95% confidence interval is

101. [24.9008, 29.0992]

$$\bar{x} \pm t_{\alpha/2,df} \frac{s}{\sqrt{n}} = 152 \pm 2.132\left(\frac{17.72}{2.2361}\right) = 152 \pm 16.8951 = [135.1049, 168.8951]$$.

Feedback: Since the population standard deviation is not known, we use the t distribution with $df = n-1 = 4$ to construct the confidence interval. We first calculate the sample mean and sample standard deviation as $\bar{x} = \frac{\sum x_i}{n} = \frac{760}{5} = 152$ and $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n}} = \sqrt{314} = 17.72$. The 90% confidence interval is

102. [135.1049, 168.8951]

b. $\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.78 \pm 1.96\sqrt{\frac{(0.78)(0.22)}{100}} = 0.78 \pm 0.0811 = [0.6989, 0.8611]$

Feedback: a. $\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.78 \pm 1.645\sqrt{\frac{(0.78)(0.22)}{100}} = 0.78 \pm 0.0681 = [0.7119, 0.8481]$

103. [0.7119, 0.8481]; [0.6989, 0.8611]

The normality condition of the sample proportion is met since both $n\bar{p}$ and $n(1-\bar{p})$ are greater than 5.

Feedback: We use $\bar{p} = \frac{150}{1500} = 0.10$. to construct the 99% confidence interval as $\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.10 \pm 2.576\sqrt{\frac{(0.10)(0.90)}{1500}} = 0.10 \pm 0.0200 = [0.0800, 0.1200]$.

104. [0.0800, 0.1200]; Yes

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.042 \pm 2.576\sqrt{\frac{0.042(1-0.042)}{1354}} = 0.042 \pm 0.0141 = [0.0279, 0.0561]$$.

Feedback: Given $\bar{p} = 0.042$ and $\alpha = 0.01$, the confidence interval is

105. [0.0279, 0.0561]

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.46 \pm 1.96\sqrt{\frac{0.46(1-0.46)}{1014}} = 0.46 \pm 0.0307 = [0.4293, 0.4907]$$.

Feedback: Given $\bar{p} = 0.46$ and $\alpha = 0.05$, the confidence interval is
106. [0.4293, 0.4907]

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.3 \pm 1.96\sqrt{\frac{0.3(1-0.3)}{2000}} = 0.3 \pm 0.0200 = [0.2800, 0.3200]$$.

Feedback: Given $\bar{p} = \frac{600}{2000} = 0.3$ and $\alpha = 0.05$, the confidence interval is
107. [0.2800, 0.3200]

$$\bar{p} \pm z_{\alpha/2}\sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 0.50 \pm 1.645\sqrt{\frac{0.5(1-0.5)}{18}} = 0.50 \pm 0.1939 = [0.3061, 0.6939]$$.

Feedback: Given $\bar{p} = 0.50$ and $\alpha = 0.10$, the confidence interval is
108. [0.3061, 0.6939]

b. $n = \left(\frac{z_{\alpha/2}\sigma}{D}\right)^2 = \left(\frac{1.96\sqrt{2.25}}{0.3}\right)^2 = 96.04$, which we round up to 97.

Feedback: a. $n = \left(\frac{z_{\alpha/2}\sigma}{D}\right)^2 = \left(\frac{1.645\sqrt{2.25}}{0.3}\right)^2 = 67.65$, which we round up to 68.
109. 68; 97

b. $n = \left(\frac{z_{\alpha/2}\hat{\sigma}}{D}\right)^2 = \left(\frac{1.96 \times 26}{8}\right)^2 = 40.58$, which we round up to 41.

Feedback: a. $n = \left(\frac{z_{\alpha/2}\hat{\sigma}}{D}\right)^2 = \left(\frac{1.96 \times 26}{5}\right)^2 = 103.88$, which we round up to 104.
110. 104; 41

Feedback: $n = \left(\frac{z_{\alpha/2}\hat{\sigma}}{D}\right)^2 = \left(\frac{2.576 \times 100}{20}\right)^2 = 165.89$, which we round up to 166 students.
111. 166

Feedback: $n = \left(\frac{z_{\alpha/2}\hat{\sigma}}{D} \right)^2 = \left(\frac{1.96 \times 12}{2} \right)^2 = 138.30$, which we round up to 139 students.
112. 139

Feedback: Using a conservative estimate of $\hat{p} = 0.50$, we find the required sample size as $n = \left(\frac{z_{\alpha/2}}{D} \right)^2 \hat{p}(1-\hat{p}) = \left(\frac{1.96}{0.08} \right)^2 (0.5)(0.5) = 150.06$, which we round up to 151.
113. 151

Feedback: Using a conservative estimate of $\hat{p} = 0.50$, we find the required sample size as $n = \left(\frac{z_{\alpha/2}}{D} \right)^2 \hat{p}(1-\hat{p}) = \left(\frac{2.576}{0.08} \right)^2 (0.5)(0.5) = 259.21$, which we round up to 260.
114. 260

Feedback: Using a conservative estimate of $\hat{p} = 0.50$, we find the required sample size as $n = \left(\frac{z_{\alpha/2}}{D} \right)^2 \hat{p}(1-\hat{p}) = \left(\frac{1.96}{0.05} \right)^2 (0.5)(1-0.5) = 384.16$, which we round up to 385.
115. 385

Feedback: Using a conservative estimate of $\hat{p} = 0.50$, we find the required sample size as $n = \left(\frac{z_{\alpha/2}}{D} \right)^2 \hat{p}(1-\hat{p}) = \left(\frac{2.576}{0.05} \right)^2 (0.5)(1-0.5) = 663.58$, which we round up to 664.
116. 664

ch08 Summary

Category	# of Questions
AACSB: Analytic	116
Blooms: Apply	39
Blooms: Remember	69
Blooms: Understand	9
Difficulty: 1 Easy	24
Difficulty: 2 Medium	58
Difficulty: 3 Hard	34
Jaggia - Chapter 08	116
Learning Objective: 08-01 Discuss point estimators and their desirable properties.	10
Learning Objective: 08-02 Explain an interval estimator.	4
Learning Objective: 08-03 Calculate a confidence interval for the population mean when the population standard deviation is known.	15
Learning Objective: 08-04 Describe the factors that influence the width of a confidence interval.	13
Learning Objective: 08-05 Discuss features of the t distribution.	12
Learning Objective: 08-06 Calculate a confidence interval for the population mean when the population standard deviation is not known.	20
Learning Objective: 08-07 Calculate a confidence interval for the population proportion.	17
Learning Objective: 08-08 Select a sample size to estimate the population mean and the population proportion.	25
Topic: Confidence Interval of the Population Mean When σ Is Known	30
Topic: Confidence Interval of the Population Mean When σ Is Unknown	32
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