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Time: _____	**Book:** Triola: Elementary Statistics, 11e	

1. In a test of the effectiveness of garlic for lowering cholesterol, 43 subjects were treated with garlic in a processed tablet form. Cholesterol levels were measured before and after the treatment. The changes in their levels of LDL cholesterol (in mg/dL) have a mean of 3.3 and a standard deviation of 16.5. Complete parts (a) and (b) below.

a. What is the best point estimate of the population mean net change in LDL cholesterol after the garlic treatment?

The best point estimate is ☐ mg/dL.
(Type an integer or a decimal.)

b. Construct a 95% confidence interval estimate of the mean net change in LDL cholesterol after the garlic treatment. What does the confidence interval suggest about the effectiveness of garlic in reducing LDL cholesterol?

What is the confidence interval estimate of the population mean μ?

☐ mg/dL $< \mu <$ ☐ mg/dL
(Round to one decimal place as needed.)

What does the confidence interval suggest about the effectiveness of the treatment?

- ○ A. The confidence interval limits do not contain 0, suggesting that the garlic treatment did affect the LDL cholesterol levels.
- ○ B. The confidence interval limits do not contain 0, suggesting that the garlic treatment did not affect the LDL cholesterol levels.
- ○ C. The confidence interval limits contain 0, suggesting that the garlic treatment did not affect the LDL cholesterol levels.
- ○ D. The confidence interval limits contain 0, suggesting that the garlic treatment did affect the LDL cholesterol levels.

2. Twelve different video games showing substance use were observed and the duration times of game play (in seconds) are listed below. The design of the study justifies the assumption that the sample can be treated as a simple random sample. Use the data to construct a 99% confidence interval estimate of μ, the mean duration of game play.

4058 3893 3853 4027 4310 4808 4664 4023 5001 4818 4341 4314

What is the confidence interval estimate of the population mean μ?

☐ $< \mu <$ ☐
(Round to one decimal place as needed.)

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3. Use the sample data and confidence level to construct the confidence interval estimate of the population proportion p.

$n = 600$, $x = 480$, 90% confidence

$\square < p < \square$ (Round to three decimal places as needed.)

4. Do one of the following, as appropriate. (a) Find the critical value $z_{\alpha/2}$, (b) find the critical value $t_{\alpha/2}$, (c) state that neither the normal nor the t distribution applies.
Confidence level 99%; $n = 15$; σ is unknown; population appears to be normally distributed.

Find the critical value.

- A. $t_{\alpha/2} = 2.624$
- B. $z_{\alpha/2} = 2.58$
- C. $z_{\alpha/2} = 2.33$
- D. $t_{\alpha/2} = 2.977$
- E. Neither normal nor t distribution applies.

5. An IQ test is designed so that the mean is 100 and the standard deviation is 10 for the population of normal adults. Find the sample size necessary to estimate the mean IQ score of statistics students such that it can be said with 90% confidence that the sample mean is within 3 IQ points of the true mean. Assume that $\sigma = 10$ and determine the required sample size.

$n = \square$ (Round up to the nearest integer.)

6. Calculate the margin of error $E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$ if the necessary requirements are satisfied.

The confidence level is 95%, the sample size is $n = 117$, and $\sigma = 18$.

Are the necessary requirements satisfied?

- Yes
- No

$E = \square$ (Round to three decimal places as needed.)

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7. A simple random sample will be obtained from a normally distributed population. Find the minimum sample size needed to be 95% confident that the sample variance is within 10% of the population variance. Is such a sample size practical in most cases?

The minimum sample size needed is ☐.

Is this sample size practical?

- ○ A. Yes, because the sample size should be as large as possible for most applications.
- ○ B. No, because the sample size is excessively large to be practical for most applications.
- ○ C. Yes, because the sample size is small enough to be practical for most applications.
- ○ D. No, because it is difficult to find exactly this number of samples for most applications.

8. For a poll, 43% of 21,944 people polled answered "yes" to the given question. Given that 43% is the best estimate of the population percentage, why would we need a confidence interval? That is, what additional information does the confidence interval provide?

Choose the correct answer below.

- ○ A. Information about the mean of the sample.
- ○ B. Information about the standard deviation of the population.
- ○ C. Information about the accuracy of the estimate.
- ○ D. Information about the mean of the population.

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9. In a study designed to test the effectiveness of magnets for treating back pain, 40 patients were given a treatment with magnets and also a sham treatment without magnets. Pain was measured using a scale from 0 (no pain) to 100 (extreme pain). After given the magnet treatments, the 40 patients had pain scores with a mean of 7.0 and a standard deviation of 2.8. After being given the sham treatments, the 40 patients had pain scores with a mean of 8.5 and a standard deviation of 2.4. Complete parts (a) through (c) below.

a. Construct the 90% confidence interval estimate of the mean pain score for patients given the magnet treatment.

What is the confidence interval estimate of the population mean μ?

$\square < \mu < \square$

(Round to one decimal place as needed.)

b. Construct the 90% confidence interval estimate of the mean pain score for patients given the sham treatment.

What is the confidence interval estimate of the population mean μ?

$\square < \mu < \square$

(Round to one decimal place as needed.)

c. Compare the results. Does the treatment with magnets appear to be effective?

- ○ A. Since the confidence intervals overlap, it appears that the magnet treatments are more effective than the sham treatments.
- ○ B. Since the confidence intervals do not overlap, it appears that the magnet treatments are more effective than the sham treatments.
- ○ C. Since the confidence intervals do not overlap, it appears that the magnet treatments are less effective than the sham treatments.
- ○ D. Since the confidence intervals overlap, it appears that the magnet treatments are less effective than the sham treatments.

10. Use the given margin of error, confidence level, and population standard deviation, σ, to find the minimum sample size required to estimate an unknown population mean, μ.

Margin of error: 0.8 inches, confidence level: 99%, $\sigma = 2.8$ inches

A confidence level of 99% requires a mimimum sample size of $\square$.

(Round up to the nearest integer.)

11. Salaries of 33 college graduates who took a statistics course in college have a mean, $\bar{x}$, of \$69,000. Assuming a standard deviation, σ, of \$15,102, construct a 95% confidence interval for estimating the population mean μ.

$\$\square < \mu < \$\square$ (Round to the nearest integer as needed.)

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12. In general, what is a point estimate of a population parameter? Given a simple random sample of heights from some population, such as the population of all basketball players in the NBA, how would you find the best point estimate of the population mean?

Choose the correct answer below.

- ○ A. A point estimate is a single value used to estimate the population parameter. The best point estimate of the population mean is the sample midrange.
- ○ B. A point estimate is a single value used to estimate the population parameter. The best point estimate of the population mean is the sample median.
- ○ C. A point estimate is a single value used to estimate the population parameter. The best point estimate of the population mean is the sample mean.
- ○ D. A point estimate is a single value used to estimate the population parameter. The best point estimate of the population mean is the sample mode.

13. Do one of the following, as appropriate. (a) Find the critical value $z_{\alpha/2}$, (b) find the critical value $t_{\alpha/2}$, (c) state that neither the normal nor the t distribution applies.
Confidence level 98%; $n = 15$; $\sigma = 18.5$; population appears to be normally distributed.

Find the critical value.

- ○ A. $z_{\alpha/2} = 2.06$
- ○ B. $t_{\alpha/2} = 2.624$
- ○ C. $z_{\alpha/2} = 2.33$
- ○ D. $t_{\alpha/2} = 2.264$
- ○ E. Neither normal nor t distribution applies.

14. Find the critical values χ^2_L and χ^2_R that correspond to the given confidence level and sample size.

90%; $n = 24$

$\chi^2_L =$ ☐
(Round to three decimal places as needed.)

$\chi^2_R =$ ☐
(Round to three decimal places as needed.)

15. Many states are carefully considering steps that would help them collect sales taxes on items purchased through the Internet. How many randomly selected sales transactions must be surveyed to determine the percentage that transpired over the Internet? Assume that we want to be 95% confident that the sample percentage is within five percentage points of the true population percentage for all sales transactions.

$n =$ ☐ (Round up to the nearest integer.)

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16. Express the confidence interval $0.333 < p < 0.777$ in the form $\hat{p} \pm E$.

$\hat{p} \pm E =$ ☐ $\pm$ ☐

17. A study of 420,033 cell phone users found that 131 of them developed cancer of the brain or nervous system. Prior to this study of cell phone use, the rate of such cancer was found to be 0.0228% for those not using cell phones. Complete parts (a) and (b).

a. Use the sample data to construct a 95% confidence interval estimate of the percentage of cell phone users who develop cancer of the brain or nervous system.

☐% < p < ☐%
(Round to four decimal places as needed.)

b. Do cell phone users appear to have a rate of cancer of the brain or nervous system that is different from the rate of such cancer among those not using cell phones? Why or why not?

- ○ A. No, because 0.0228% is not included in the confidence interval.
- ○ B. Yes, because 0.0228% is not included in the confidence interval.
- ○ C. Yes, because 0.0228% is included in the confidence interval.
- ○ D. No, because 0.0228% is included in the confidence interval.

18. A clinical trial tests a method designed to increase the probability of conceiving a girl. In the study 360 babies were born, and 324 of them were girls. Use the sample data to construct a 99% confidence interval estimate of the percentage of girls born. Based on the result, does the method appear to be effective?

☐ < p < ☐ (Round to three decimal places as needed.)

Does the method appear to be effective?

- ○ No, the proportion of girls is not significantly different from 0.5.
- ○ Yes, the proportion of girls is significantly different from 0.5.

19. Use the given confidence interval limits to find the point estimate $\hat{p}$ and the margin of error E.

$0.473 < p < 0.515$

$\hat{p} =$ ☐
$E =$ ☐
(Type an integer or a decimal.)

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20. Using the simple random sample of weights of women from a data set, we obtain these sample statistics: $n = 40$ and $\bar{x} = 147.25$ lb. Research from other sources suggests that the population of weights of women has a standard deviation given by $\sigma = 32.08$ lb.

a. Find the best point estimate of the mean weight of all women.

b. Find a 90% confidence interval estimate of the mean weight of all women.

a. The best point estimate is ☐ lb.

(Type an integer or a decimal.)

b. The 90% confidence interval estimate is ☐ lb $< \mu <$ ☐ lb.

(Round to two decimal places as needed.)

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1. 3.3
   − 1.8
   8.4
   C

2. 3989.4
   4695.6

3. 0.773
   0.827

4. D

5. 31

6. the first choice
   3.262

7. 805
   C

8. C

9. 6.3
   7.7
   7.9
   9.1
   B

10. 82

11. 63,847
    74,153

12. C

13. C

14. 13.091
    35.172

15. 385

16. 0.555
0.222

17. 0.0258
0.0365
B

18. 0.859
0.941
the second choice

19. 0.494
0.021

20. 147.25
138.91
155.59