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

2. Find the critical value $z_{\alpha/2}$ that corresponds to the given confidence level.

83%

$z_{\alpha/2} =$ ☐ (Round to two decimal places as needed.)

3. Express the confidence interval $0.666 < p < 0.888$ in the form $\hat{p} \pm E$.

$\hat{p} \pm E =$ ☐ $\pm$ ☐

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

(0.784,0.838)

$\hat{p} =$ ☐

$E =$ ☐

5. Assume that a random sample is used to estimate a population proportion p. Find the margin of error E that corresponds to the given statistics and confidence level.

$n = 500$, $x = 150$, 95% confidence

The margin of error $E =$ ☐. (Round to four decimal places as needed.)

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

$n = 550$, $x = 220$, 90% confidence

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

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7. Use the given data to find the minimum sample size required to estimate a population proportion or percentage.

Margin of error: 0.03; confidence level 95%; $\hat{p}$ and $\hat{q}$ unknown

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

8. A clinical trial tests a method designed to increase the probability of conceiving a girl. In the study 385 babies were born, and 308 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.

9. A study of 420,017 cell phone users found that 140 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 0.0432% for those not using cell phones. Complete parts (a) and (b).

a. Use the sample data to construct a 90% 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. Yes, because 0.0432% is not included in the confidence interval.
- ○B. No, because 0.0432% is not included in the confidence interval.
- ○C. Yes, because 0.0432% is included in the confidence interval.
- ○D. No, because 0.0432% is included in the confidence interval.

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10. Use the data in the table to the right to answer the following questions.

Find the sample proportion of candy that are red.

The proportion of red candy = ☐
(Type an integer or decimal rounded to three decimal places as needed.)

Use that result to construct a 90% confidence interval estimate of the population percentage of candy that are red.

☐% < p < ☐%
(Type an integer or decimal rounded to one decimal place as needed.)

Is the result consistent with the 31% rate that is reported by the candy maker?

- ○ Yes, because the confidence interval includes 31%.
- ○ No, because the confidence interval does not include 31%.

Weights (g) of a Sample Bag of Candy

Red	Blue	Brown	Green	Yellow
0.966	0.743	0.964	0.954	0.986
0.763	0.916	0.979	0.746	0.877
0.786	0.921	0.812	0.886	0.876
0.783	0.731	0.802	0.988	0.943
0.882	0.789	0.728	0.887	0.838
0.848	0.727		0.901	0.718
	0.854		0.893	0.985
	0.758		0.775	0.846
			0.837	0.712
				0.763

11. 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 mean.
- ○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 mode.
- ○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 median.

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

The confidence level is 90%, the sample size is $n = 99$, and $\sigma = 12$.

Are the necessary requirements satisfied?

- ○ Yes
- ○ No

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

13. Use the given information to find the minimum sample size required to estimate an unknown population mean μ.

How many adults must be randomly selected to estimate the mean FICO (credit rating) score of working adults in a country? We want 90% confidence that the sample mean is within 3 points of the population mean, and the population standard deviation is 68.

The minimum sample size required is ☐ adults.
(Round up to the nearest whole number.)

14. Using the simple random sample of weights of women from a data set, we obtain these sample statistics: $n = 35$ and $\bar{x} = 143.51$ lb. Research from other sources suggests that the population of weights of women has a standard deviation given by $\sigma = 32.01$ 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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15. A study of the ages of motorcyclists killed in crashes involves the random selection of 143 drivers with a mean of 35.28 years. Assuming that $\sigma = 8.3$ years, construct and interpret a 99% confidence interval estimate of the mean age of all motorcyclists killed in crashes.

What is the 99% confidence interval for the population mean μ?

$\square < \mu < \square$ (Round to two decimal places as needed.)

Notice that the confidence interval limits do not include ages below 20 years. What does this mean?

- ○ A. Motorcyclists under the age of 20 rarely die in crashes.
- ○ B. The mean of the population will most likely not be less than 20 years.
- ○ C. The mean of the population will never be less than 20 years.
- ○ D. There is a 99% chance that the population mean will not be less than 20 years.

16. Salaries of 33 college graduates who took a statistics course in college have a mean, $\bar{x}$, of \$62,000. Assuming a standard deviation, σ, of \$13,115, construct a 90% confidence interval for estimating the population mean μ.

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

17. A simple random sample of size $n = 5$ is obtained from the population of drivers living in New York City, and the braking reaction time of each driver is measured. The results are to be used for constructing a 95% confidence interval. What is the number of degrees of freedom that should be used for finding the critical value $t_{\alpha/2}$?

Choose the correct answer below.

- ○ A. The number of degrees of freedom is 6.
- ○ B. The number of degrees of freedom is 4.
- ○ C. The number of degrees of freedom is 1.
- ○ D. The number of degrees of freedom is 5.

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18. 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 95%; $n = 23$; σ is unknown; population appears to be normally distributed.

Find the critical value.

- ○A. $z_{\alpha/2} = 1.96$
- ○B. $t_{\alpha/2} = 2.074$
- ○C. $z_{\alpha/2} = 1.65$
- ○D. $t_{\alpha/2} = 1.717$
- ○E. Neither normal nor t distribution applies.

19. 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%; $n = 28$; σ is known; population appears to be very skewed.

Find the critical value.

- ○A. $z_{\alpha/2} = 2.58$
- ○B. $z_{\alpha/2} = 2.33$
- ○C. $t_{\alpha/2} = 2.473$
- ○D. $t_{\alpha/2} = 2.771$
- ○E. Neither normal nor t distribution applies.

20. Use the given confidence level and sample data to find (a) the margin of error and (b) the confidence interval for the population mean μ. Assume that the population has a normal distribution.

Weight lost on a diet: 95% confidence; $n = 51$, $\bar{x} = 3.0$ kg, $s = 5.1$ kg.

(a) E = ☐ kg (Round to one decimal place as needed.)

(b) What is the confidence interval for the population mean μ?

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

21. In a test of the effectiveness of garlic for lowering cholesterol, 42 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 3.4 and a standard deviation of 18.4. 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 99% 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 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 do not contain 0, suggesting that the garlic treatment did affect the LDL cholesterol levels.

22. A data set includes 104 body temperatures of healthy adult humans for which $\bar{x} = 98.3°F$ and $s = 0.62°F$. Complete parts (a) and (b) below.

a. What is the best point estimate of the mean body temperature of all healthy humans?

The best point estimate is ☐ °F.
(Type an integer or a decimal.)

b. Using the sample statistics, construct a 90% confidence interval estimate of the mean body temperature of all healthy humans. Do the confidence interval limits contain 98.6°F? What does the sample suggest about the use of 98.6°F as the mean body temperature?

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

☐ °F < μ < ☐ °F
(Round to one decimal place as needed.)

Do the confidence interval limits contain 98.6°F?

- ○ No
- ○ Yes

What does this suggest about the use of 98.6°F as the mean body temperature?

- ○A. This suggests that the mean body temperature could be higher than 98.6°F.
- ○B. This suggests that the mean body temperature could very possibly be 98.6°F.
- ○C. This suggests that the mean body temperature could be lower than 98.6°F.

23. 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 95% confidence interval estimate of μ, the mean duration of game play.

4044 3889 3867 4025 4314 4811 4664 4030 5014 4816 4342 4317

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

☐ < μ < ☐
(Round to one decimal place as needed.)

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24. Is the confidence interval $0.0455g < \sigma < 0.0602g$ equivalent to the expression $(0.0455g, 0.0602g)$? Is it equivalent to the expression $0.05285g \pm 0.00735g$?

Choose the correct answer below.

- A. No; No
- B. No; Yes
- C. Yes; No
- D. Yes; Yes

25. 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.)

26. Use the given confidence level and sample data to find a confidence interval for the population standard deviation σ. Assume that a simple random sample has been selected from a population that has a normal distribution.

Salaries of college professors who took a poetry course in college

80% confidence; $n = 51$, $\bar{x} = \$63{,}800$, $s = \$16{,}539$

$\$$☐ $< \sigma <$ $\$$☐
(Round to the nearest dollar as needed.)

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27. A simple random sample from a population with a normal distribution of 109 body temperatures has $\bar{x} = 98.20°F$ and $s = 0.61°F$. Construct a 98% confidence interval estimate of the standard deviation of body temperature of all healthy humans. Is it safe to conclude that the population standard deviation is less than 1.80°F?

□°F < σ < □°F

(Round to two decimal places as needed.)

Is it safe to conclude that the population standard deviation is less than 1.80°F?

- ○ A. This conclusion is safe because 1.80°F is in the confidence interval.
- ○ B. This conclusion is not safe because 1.80°F is in the confidence interval.
- ○ C. This conclusion is safe because 1.80°F is outside the confidence interval.
- ○ D. This conclusion is not safe because 1.80°F is outside the confidence interval.

28. Twelve different video games showing substance use were observed and the duration of 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 sample data to construct an 80% confidence interval estimate of σ, the standard deviation of the duration times of game play. Assume that this sample was obtained from a population with a normal distribution.

4,227	4,750	4,346	4,077	4,653	4,411
4,370	5,020	4,084	4,826	4,629	4,157

The confidence interval estimate is □ sec < σ < □ sec.

(Round to one decimal place as needed.)