

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the indicated critical z value.

- 1) Find the critical value $z_{\alpha/2}$ that corresponds to a 94% confidence level. 1) _____
 A) 1.555 B) 1.88 C) 2.75 D) 1.96
- 2) Find the critical value $z_{\alpha/2}$ that corresponds to a 98% confidence level. 2) _____
 A) 2.33 B) 2.575 C) 1.75 D) 2.05

Determine whether the given conditions justify using the margin of error $E = z_{\alpha/2} \sigma/\sqrt{n}$ when finding a confidence interval estimate of the population mean μ .

- 3) The sample size is $n = 6$, $\sigma = 12.3$, and the original population is normally distributed. 3) _____
 A) Yes B) No
- 4) The sample size is $n = 5$ and σ is not known. 4) _____
 A) Yes B) No

Use the confidence level and sample data to find the margin of error E. Round your answer to the same number of decimal places as the sample mean unless otherwise noted.

- 5) Weights of eggs: 95% confidence; $n = 45$, $\bar{x} = 1.50$ oz, $\sigma = 0.20$ oz 5) _____
 A) 0.05 oz B) 0.01 oz C) 0.44 oz D) 0.06 oz
- 6) Systolic blood pressures for women aged 18-24: 94% confidence; $n = 93$, $\bar{x} = 113.2$ mm Hg, $\sigma = 12.8$ mm Hg 6) _____
 A) 48.9 mm Hg B) 2.1 mm Hg C) 2.3 mm Hg D) 2.5 mm Hg
- 7) The duration of telephone calls directed by a local telephone company: $\sigma = 4.2$ minutes, $n = 580$, 85% confidence. Round your answer to the nearest thousandth. 7) _____
 A) 0.251 min B) 0.005 min C) 0.010 min D) 0.121 min

Use the confidence level and sample data to find a confidence interval for estimating the population μ . Round your answer to the same number of decimal places as the sample mean.

- 8) Test scores: $n = 99$, $\bar{x} = 88.6$, $\sigma = 7.7$; 99% confidence 8) _____
 A) $87.3 < \mu < 89.9$ B) $86.6 < \mu < 90.6$ C) $87.1 < \mu < 90.1$ D) $86.8 < \mu < 90.4$
- 9) A random sample of 112 full-grown lobsters had a mean weight of 22 ounces and a standard deviation of 3.8 ounces. Construct a 98% confidence interval for the population mean μ . 9) _____
 A) $21 \text{ oz} < \mu < 24 \text{ oz}$ B) $22 \text{ oz} < \mu < 24 \text{ oz}$
 C) $21 \text{ oz} < \mu < 23 \text{ oz}$ D) $20 \text{ oz} < \mu < 22 \text{ oz}$
- 10) A group of 56 randomly selected students have a mean score of 20.4 with a standard deviation of 4.4 on a placement test. What is the 90% confidence interval for the mean score, μ , of all students taking the test? 10) _____
 A) $19.0 < \mu < 21.8$ B) $19.2 < \mu < 21.6$ C) $19.4 < \mu < 21.4$ D) $18.9 < \mu < 21.9$

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

- 11) Margin of error: \$140, confidence level: 95%, $\sigma = \$589$ 11) _____
A) 48 B) 96 C) 60 D) 68
- 12) How many women must be randomly selected to estimate the mean weight of women in one age group. We want 90% confidence that the sample mean is within 2.7 lb of the population mean, and the population standard deviation is known to be 22 lb. 12) _____
A) 180 B) 181 C) 256 D) 178
- 13) How many weeks of data must be randomly sampled to estimate the mean weekly sales of a new line of athletic footwear? We want 95% confidence that the sample mean is within \$200 of the population mean, and the population standard deviation is known to be \$1300. 13) _____
A) 163 B) 115 C) 230 D) 281

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.

- 14) 90%; $n = 10$; σ is unknown; population appears to be normally distributed. 14) _____
A) $t_{\alpha/2} = 1.833$ B) $z_{\alpha/2} = 2.262$ C) $z_{\alpha/2} = 1.383$ D) $t_{\alpha/2} = 1.812$
- 15) 98%; $n = 7$; $\sigma = 27$; population appears to be normally distributed. 15) _____
A) $z_{\alpha/2} = 2.33$ B) $t_{\alpha/2} = 1.96$ C) $t_{\alpha/2} = 2.575$ D) $z_{\alpha/2} = 2.05$

Assume that a sample is used to estimate a population mean μ . Use the given confidence level and sample data to find the margin of error. Assume that the sample is a simple random sample and the population has a normal distribution. Round your answer to one more decimal place than the sample standard deviation.

- 16) 95% confidence; $n = 91$; $\bar{x} = 24$, $s = 14.7$ 16) _____
A) 2.75 B) 3.06 C) 5.26 D) 2.62
- 17) 95% confidence; $n = 12$; $\bar{x} = 31.8$; $s = 9.4$ 17) _____
A) 7.16 B) 4.48 C) 5.97 D) 5.37

Use the given degree of confidence and sample data to construct a confidence interval for the population mean μ . Assume that the population has a normal distribution.

- 18) $n = 10$, $\bar{x} = 14.4$, $s = 4.3$, 95% confidence 18) _____
A) $11.37 < \mu < 17.43$ B) $11.91 < \mu < 16.89$
C) $11.32 < \mu < 17.48$ D) $11.34 < \mu < 17.46$
- 19) Thirty randomly selected students took the calculus final. If the sample mean was 76 and the standard deviation was 11.2, construct a 99% confidence interval for the mean score of all students. 19) _____
A) $70.38 < \mu < 81.62$ B) $72.53 < \mu < 79.47$
C) $70.36 < \mu < 81.64$ D) $70.97 < \mu < 81.03$
- 20) A sociologist develops a test to measure attitudes towards public transportation, and 27 randomly selected subjects are given the test. Their mean score is 76.2 and their standard deviation is 21.4. Construct the 95% confidence interval for the mean score of all such subjects. 20) _____
A) $64.2 < \mu < 88.2$ B) $74.6 < \mu < 77.8$ C) $67.7 < \mu < 84.7$ D) $69.2 < \mu < 83.2$

- 21) A savings and loan association needs information concerning the checking account balances of its local customers. A random sample of 14 accounts was checked and yielded a mean balance of \$664.14 and a standard deviation of \$297.29. Find a 98% confidence interval for the true mean checking account balance for local customers. 21) _____
- A) $\$455.65 < \mu < \872.63 B) $\$492.52 < \mu < \835.76
 C) $\$453.59 < \mu < \874.69 D) $\$493.71 < \mu < \834.57

Solve the problem.

- 22) Find the critical value χ^2_R corresponding to a sample size of 9 and a confidence level of 95 percent. 22) _____
- A) 15.507 B) 17.535 C) 2.733 D) 2.18
- 23) Find the critical value χ^2_L corresponding to a sample size of 23 and a confidence level of 90 percent. 23) _____
- A) 33.924 B) 9.542 C) 12.338 D) 40.289
- 24) Find the chi-square value χ^2_L corresponding to a sample size of 10 and a confidence level of 99 percent. 24) _____
- A) 2.088 B) 21.666 C) 23.589 D) 1.735

Use the given degree of confidence and sample data to find a confidence interval for the population standard deviation σ . Assume that the population has a normal distribution. Round the confidence interval limits to the same number of decimal places as the sample standard deviation.

- 25) College students' annual earnings: 98% confidence; $n = 9, \bar{x} = \$4091, s = \856 25) _____
- A) $\$578 < \sigma < \1640 B) $\$674 < \sigma < \1117
 C) $\$540 < \sigma < \1887 D) $\$520 < \sigma < \1675
- 26) The mean replacement time for a random sample of 20 washing machines is 10.3 years and the standard deviation is 2.7 years. Construct a 99% confidence interval for the standard deviation, σ , of the replacement times of all washing machines of this type. 26) _____
- A) $2.0 \text{ yr} < \sigma < 4.3 \text{ yr}$ B) $1.9 \text{ yr} < \sigma < 5.7 \text{ yr}$
 C) $1.8 \text{ yr} < \sigma < 5.1 \text{ yr}$ D) $1.9 \text{ yr} < \sigma < 4.5 \text{ yr}$
- 27) A sociologist develops a test to measure attitudes about public transportation, and 27 randomly selected subjects are given the test. Their mean score is 76.2 and their standard deviation is 21.4. Construct the 95% confidence interval for the standard deviation, σ , of the scores of all subjects. 27) _____
- A) $16.9 < \sigma < 29.3$ B) $17.2 < \sigma < 27.2$ C) $17.5 < \sigma < 27.8$ D) $16.6 < \sigma < 28.6$

Find the appropriate minimum sample size.

- 28) You want to be 99% confident that the sample standard deviation s is within 5% of the population standard deviation. 28) _____
- A) 2434 B) 2638 C) 1336 D) 923
- 29) To be able to say with 95% confidence level that the standard deviation of a data set is within 10% of the population's standard deviation, the number of observations within the data set must be greater than or equal to what quantity? 29) _____
- A) 805 B) 250 C) 335 D) 192

Provide an appropriate response.

- 30) The confidence interval, $18.34 < \sigma^2 < 84.51$, for the population variance is based on the following sample statistics: $n = 25$, $\bar{x} = 31.6$ and $s = 5.9$. What is the degree of confidence? 30) _____
- A) 95% B) 90% C) 98% D) 99%

Express the null hypothesis and the alternative hypothesis in symbolic form. Use the correct symbol (μ , p , σ) for the indicated parameter.

- 31) An entomologist writes an article in a scientific journal which claims that fewer than 14 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Use the parameter p , the true proportion of fireflies unable to produce light. 31) _____
- A) $H_0: p = 0.0014$ B) $H_0: p > 0.0014$ C) $H_0: p = 0.0014$ D) $H_0: p < 0.0014$
H₁: $p < 0.0014$ H₁: $p \leq 0.0014$ H₁: $p > 0.0014$ H₁: $p \geq 0.0014$

- 32) A skeptical paranormal researcher claims that the proportion of Americans that have seen a UFO, p , is less than 1 in every one thousand. 32) _____
- A) $H_0: p = 0.001$ B) $H_0: p > 0.001$ C) $H_0: p = 0.001$ D) $H_0: p < 0.001$
H₁: $p < 0.001$ H₁: $p \leq 0.001$ H₁: $p > 0.001$ H₁: $p \geq 0.001$

Assume that the data has a normal distribution and the number of observations is greater than fifty. Find the critical z value used to test a null hypothesis.

- 33) $\alpha = 0.05$ for a two-tailed test. 33) _____
- A) ± 1.645 B) ± 2.575 C) ± 1.764 D) ± 1.96

Find the value of the test statistic z using $z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$.

- 34) A claim is made that the proportion of children who play sports is less than 0.5, and the sample statistics include $n = 1469$ subjects with 30% saying that they play a sport. 34) _____
- A) -31.29 B) 15.33 C) -15.33 D) 31.29

- 35) The claim is that the proportion of accidental deaths of the elderly attributable to residential falls is more than 0.10, and the sample statistics include $n = 800$ deaths of the elderly with 15% of them attributable to residential falls. 35) _____
- A) 3.96 B) -4.71 C) 4.71 D) -3.96

Provide an appropriate response.

- 36) You wish to test the claim that $\mu > 32$ at a level of significance of $\alpha = 0.05$ and are given sample statistics $n = 50$, $\bar{x} = 32.3$, and $s = 1.2$. Compute the value of the standardized test statistic. Round your answer to two decimal places. 36) _____
- A) 0.98 B) 1.77 C) 3.11 D) 2.31

- 37) You wish to test the claim that $\mu = 1240$ at a level of significance of $\alpha = 0.01$ and are given sample statistics $n = 35$, $\bar{x} = 1210$ and $s = 82$. Compute the value of the standardized test statistic. Round your answer to two decimal places. 37) _____
- A) -3.82 B) -4.67 C) -2.16 D) -5.18

- 38) Find the standardized test statistic t for a sample with $n = 12$, $\bar{x} = 22.2$, $s = 2.2$, and $\alpha = 0.01$ if $H_0: \mu = 21$. Round your answer to three decimal places. 38) _____
 A) 1.890 B) 2.001 C) 2.132 D) 1.991
- 39) Compute the standardized test statistic, χ^2 , to test the claim $\sigma^2 > 1.9$ if $n = 18$, $s^2 = 2.7$, and $\alpha = 0.01$. 39) _____
 A) 24.158 B) 43.156 C) 33.233 D) 28.175
- 40) Compute the standardized test statistic, χ^2 to test the claim $\sigma^2 \neq 61.2$ if $n = 10$, $s^2 = 67.5$, and $\alpha = 0.01$. 40) _____
 A) 3.276 B) 12.008 C) 9.926 D) 4.919

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Assume that a simple random sample has been selected from a normally distributed population and test the given claim. Use either the traditional method or P-value method as indicated. Identify the null and alternative hypotheses, test statistic, critical value(s) or P-value (or range of P-values) as appropriate, and state the final conclusion that addresses the original claim.

- 41) A researcher wants to test the claim that convicted burglars spend an average of 18.7 months in jail. She takes a random sample of 11 such cases from court files and finds that $\bar{x} = 21.2$ months and $s = 7.4$ months. Test the claim that $\mu = 18.7$ months at the 0.05 significance level. Use the traditional method of testing hypotheses. 41) _____

Use the traditional method to test the given hypothesis. Assume that the population is normally distributed and that the sample has been randomly selected.

- 42) When 12 bolts are tested for hardness, their indexes have a standard deviation of 41.7. Test the claim that the standard deviation of the hardness indexes for all such bolts is greater than 30.0. Use a 0.025 level of significance. 42) _____

Answer Key

Testname: STATS-3-REVIEW

- 1) B
- 2) A
- 3) A
- 4) B
- 5) D
- 6) D
- 7) A
- 8) B
- 9) C
- 10) C
- 11) D
- 12) A
- 13) A
- 14) A
- 15) A
- 16) B
- 17) C
- 18) C
- 19) C
- 20) C
- 21) C
- 22) B
- 23) C
- 24) D
- 25) C
- 26) D
- 27) A
- 28) C
- 29) D
- 30) D
- 31) A
- 32) A
- 33) D
- 34) C
- 35) C
- 36) B
- 37) C
- 38) A
- 39) A
- 40) C
- 41) $H_0: \mu = 18.7$ mo. $H_1: \mu \neq 18.7$ mo. Test statistic: $t = 1.12$. Critical values: $t = \pm 2.228$. Fail to reject H_0 . There is not sufficient evidence to warrant rejection of the claim that the mean is 18.7 months.
- 42) Test statistic: $\chi^2 = 21.253$. Critical value: $\chi^2 = 21.920$. Fail to reject the null hypothesis. There is not sufficient evidence to support the claim that the standard deviation is greater than 30.0.