

Case 1: A simple random sample of 60 items from a population with $\sigma = 12$ resulted in a sample mean of 35

1. Which of the following statements is most unreasonable, not true, about confidence interval estimates of the population mean?
 - a. A 90% confidence interval for the population mean is 35 ± 2.541
 - b. A 98% confidence interval for the population mean is 35 ± 3.61
 - c. A 99% confidence interval for the population mean is 35 ± 3.02
 - d. A 95% confidence interval for the population mean is 35 ± 3.036

Case 2: In an effort to estimate the mean amount spent per customer for dinner at a major Atlanta restaurant, data were collected for a sample of 64 customers. Assume a population standard deviation of \$5.

2. Which of the following statements is most unreasonable, not true, about the effort to estimate the mean?
 - a. At 90% confidence, the margin of error is 1.025
 - b. At 95% confidence, the margin of error is 1.225
 - c. At 98% confidence, the margin of error is 1.456
 - d. If the sample mean is \$37.80, the 99% confidence interval for the population mean is 37.80 ± 1.613
 - e. If the sample mean is \$37.80, the 95% confidence interval for the population mean is 37.80 ± 1.4

Case 3&4 : A survey of small businesses with Web sites found that the average amount spent on a site was \$10,500 per year (Questions 3 & 4).

3. Which of the following statements is MOST unreasonable, false?
 - a. If $n = 100$ businesses and $\sigma = \$4000$, the margin of error associated with a 95% confidence interval is \$784
 - b. If $n = 64$ businesses and $\sigma = \$4000$, the margin of error associated with a 95% confidence interval is \$780
 - c. If $n = 64$ businesses and $\sigma = \$4000$, the margin of error associated with a 90% confidence interval is \$820
 - d. If $n = 100$ businesses and $\sigma = \$3178.3$, the margin of error associated with a 99% confidence interval is \$820
 - e. Everything else being the same, the sample size n would need to be increased to reduce the margin of error.
4. Which of the following statements is MOST unreasonable, false?
 - a. If $n = 31$ businesses and $s = 4000$, the margin of error associated with a 95% confidence interval is \$1467
 - b. If $n = 41$ businesses and $s = \$4000$, the margin of error associated with a 90% confidence interval is \$1052
 - c. If $n = 31$ businesses and $s = \$3000$, the margin of error associated with a 95% confidence interval is \$1100
 - d. If $n = 41$ businesses and $s = \$3000$, the margin of error associated with a 99% confidence interval is \$1267
 - e. If $n = 41$ businesses and $s = \$3000$, the margin of error associated with a 90% confidence interval is \$1053

Case 5: The American Association of Advertising Agencies records data on nonprogram minutes on half-hour, prime-time television shows. Representative data in minutes for a sample of 20 prime-time shows on major networks at 8:30 P.M. follow. (For question 5)

9.9	7.0	7.2	7.0	9.0	7.3	6.0	6.6	6.3	5.7	6.5	6.5
7.6	8.5	5.8	6.2	6.4	8.2	7.2	6.8				

5. Assume a normal population and provide a point estimate and a 95% confidence interval for the mean number of non-program minutes on half-hour, prime-time television shows at 8:30 P.M.
 - a. 20 ± 0.512
 - b. 7.085 ± 2.09
 - c. 20 ± 2.09
 - d. 7.085 ± 0.512

Case 6: Complaints about rising prescription drug prices caused the U.S. Congress to consider laws that would force pharmaceutical companies to offer prescription discounts to senior citizens without drug benefits. The House Government Reform Committee provided data on the prescription cost for some of the most widely used drugs. Assume the following data show a sample of the prescription cost in dollars for Zocor, a drug used to lower cholesterol. (For question 6)

110	112	115	125	100	130	104	126
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6. Given a normal population, what is the 95% confidence interval estimate of the population mean cost for a prescription of Zocor?
- 115.25 ± 9.08
 - 8 ± 9.08
 - 8 ± 2.365
 - 115.25 ± 2.365

Case 7: Annual starting salaries for college graduates with degrees in business administration are generally expected to be between \$25,000 and \$35,000. Assume that a 90% confidence interval estimate of the population mean annual starting salary is desired. (For question 7)

7. Which of the following statements is most unreasonable, FALSE?
- The planning value for the population standard deviation is 2500
 - If the desired margin of error is \$500, the required sample size should be 168.
 - If the desired margin of error is \$200, the required sample size should be 423.
 - If the desired margin of error is \$100, the required sample size should be 1691.
 - To reduce the desired margin of error, the required sample size should be increased.

Case 8: Smith Travel Research provides information on the one-night cost of hotel rooms throughout the United States. Use \$3 as the desired margin of error and \$22.50 as the planning value for the population standard deviation. (For question 8)

8. Which of the following statements is most unreasonable, FALSE?
- The required sample size for a 90% confidence interval estimate of the population mean cost of hotel rooms is 153
 - The required n for a 95% confidence interval estimate of the population mean cost of hotel rooms is 217
 - The required n for a 98% confidence interval estimate of the population mean cost of hotel rooms is 216
 - The required sample size for a 99% confidence interval estimate of the population mean cost of hotel rooms is 374
 - When the desired margin of error is fixed, the required sample size gets larger as the confidence level is increased

Case 9: Consider the following hypothesis test.

$$H_0: \mu \leq 25$$

$$H_a: \mu > 25$$

A sample of 55 provided a sample mean of 26.4. The population standard deviation is 6. (For question 9)

9. At $\alpha = .01$, what is your conclusion?
- Reject H_0 .
 - Do not reject H_0 .
 - There is not enough information to answer this question
 - None of the above.

Case 10: Consider the following hypothesis test:

$$H_0: \mu = 22$$

$$H_a: \mu \neq 22$$

A sample of 75 is used and the population standard deviation is 15. Compute the p -value and state your conclusion for the following sample results. Use $\alpha = .01$. (For questions 10-11)

10. $\bar{x} = 23$

- P-value = .2810, reject H_0 .
- P-value = .4380, do not reject H_0 .
- P-value = .5620, do not reject H_0 .
- P-value = .2190, reject H_0 .

11. $\bar{x} = 25.1$

- P-value = .0367, do not reject H_0 .
- P-value = .0734, do not reject H_0 .
- P-value = .4633, reject H_0 .
- P-value = .9266, reject H_0 .

Case 13: Reis, Inc., a New York real estate research firm, tracks the cost of apartment rentals in the United States. In mid-2002, the nationwide mean apartment rental rate was \$895 per month. Assume that, based on the historical quarterly surveys, a population standard deviation of $\sigma = \$235$ is reasonable. In a current study of apartment rentals rates, a sample of 180 apartments nationwide provided a sample mean of \$925 per month. Do the sample data enable Reis to conclude that the population mean apartment rental rate now exceeds the level reported in 2002? (For questions 12-13)

12. State the null and alternative hypotheses.

- a. $H_0: \mu \neq 925$
 $H_a: \mu = 925$
- b. $H_0: \mu \leq 895$
 $H_a: \mu > 895$
- c. $H_0: \mu \leq 925$
 $H_a: \mu > 925$
- d. $H_0: \mu \neq 895$
 $H_a: \mu = 895$

13. At $\alpha = .01$, what is your conclusion?

- a. Reject H_0 ; the mean apartment rent now exceeds the level reported in 2002
- b. Do not reject H_0 ; the mean apartment rent now exceeds the level reported in 2002
- c. Do not reject H_0 ; the mean apartment rent now does NOT exceed the level reported in 2002
- d. Reject H_0 ; the mean apartment rent now does NOT exceed the level reported in 2002

Case 14: The mean length of a work week for the population of workers was reported to be 39.2 hours. Suppose that we would like to take a current sample of workers to see whether the mean length of a work week has *changed* from the previously reported 39.2 hours. (For questions 14-15)

14. State the hypotheses that will help us determine whether a change occurred in the mean length of a work week.

- a. $H_0: \mu = 39.2$
 $H_a: \mu \neq 39.2$
- b. $H_0: \mu \leq 39.2$
 $H_a: \mu > 39.2$
- c. $H_0: \mu \geq 39.2$
 $H_a: \mu < 39.2$
- d. $H_0: \mu \neq 39.2$
 $H_a: \mu = 39.2$

15. Suppose a current sample of 135 workers provided a sample mean of 38.5 hours. Use a population standard deviation $\sigma = 5.2$ hours. At $\alpha = .05$, what is your conclusion using the p-value approach of hypothesis testing?

- a. Reject H_0 because p-value is less than alpha.
- b. Reject H_0 because p-value is greater than alpha.
- c. Do not reject H_0 because p-value is greater than alpha.
- d. Do not reject H_0 because p-value is less than alpha.

Case 16: Consider the following hypothesis test.

$$H_0: \mu \leq 12$$

$$H_a: \mu > 12$$

A sample of 28 provided a sample mean $\bar{x} = 14$ and sample standard deviation $s = 5.42$. (For question 16)

16. At $\alpha = .05$, what is your conclusion?

- Do not reject H_0 because the p-value is less than alpha, α .
- Reject H_0 because the p-value is less than alpha, α .
- Do not reject H_0 because the p-value is greater than alpha, α .
- Reject H_0 because the p-value is greater than alpha, α .

Case 17: Consider the following hypothesis test. (for questions 17 and 18)

$$H_0: \mu = 100$$

$$H_a: \mu \neq 100$$

A sample of 80 is used. Compute the p-value and state your conclusion for questions 17 and 18. Use $\alpha = .05$.

17. $\bar{x} = 103$ and $s = 11.5$

- p-value is greater than .01 and less than .05; Reject H_0
- p-value is $> .05$; Reject H_0
- p-value $< .01$; Do not reject H_0
- p-value is $< .02$; Do not reject H_0

18. $\bar{x} = 101$ and $s = 8.5$

- p-value $> .05$; Reject H_0
- p-value $< .05$; Reject H_0
- p-value $> .05$; Do NOT Reject H_0
- p-value $< .05$; Do NOT Reject H_0

Case 18: The National Association of Professional Baseball Leagues, Inc., reported that attendance for 176 minor league baseball teams reached an all-time high during the 2001 season. On a per-game basis, the mean attendance for minor league baseball was 3530 people per game. Midway through the 2002 season, the president of the association asked for an attendance report that would hopefully show that the mean attendance for 2002 was exceeding the 2001 level. (For questions 19-20)

19. Formulate hypotheses that could be used to determine whether the mean attendance per game in 2002 was greater than the previous year's level.

- $H_0: \mu \geq 3530$; $H_a: \mu < 3530$
- $H_0: \mu = 3530$; $H_a: \mu \neq 3530$
- $H_0: \mu > 3530$; $H_a: \mu \leq 3530$
- $H_0: \mu \leq 3530$; $H_a: \mu > 3530$

20. Assume that a sample of 92 minor league baseball games played during the first half of the 2002 season showed a mean attendance of 3740 people per game with a sample standard deviation of 950. What is the p-value? At $\alpha = .01$, what is your conclusion?

- p-value $> .01$; Reject H_0
- p-value $< .01$; Do not Reject H_0
- p-value $< .01$; Reject H_0
- p-value $> .01$; Do not reject H_0

21. Which of the following statements is NOT true about a *point estimator*?

- A point estimator is a sample statistic used to estimate a population parameter.
- The sample mean \bar{x} is a point estimator of the population mean μ .
- A point estimator can be expected to provide the exact value of the population parameter.
- The sample proportion \bar{p} is a point estimator of the population proportion p .

22. Which of the following statements is NOT true about an *interval estimate*?
- The interval estimate is often computed by adding and subtracting a value, called the margin of error, to the point estimate.
 - The general form of an interval estimate is as follows: point estimate \pm margin of error.
 - Interval estimate provides information about how close the point estimate is to the value of the population parameter.
 - The general form of an interval estimate of a population mean μ is as follows: $\bar{p} \pm$ margin of error.
23. Which of the following statements about the *margin of error* is true?
- To develop an interval estimate of a population mean, either the population standard deviation σ or the sample standard deviation s must be used to compute the margin of error.
 - In most cases, the margin of error is computed by using the sample standard deviation s because the population standard deviation σ is not always known.
 - Margin of error is the \pm value added or subtracted from a point estimate in order to develop an interval estimate of a population parameter
 - All of the above statements about the margin of error are true.
24. Which of the following statements is NOT true about the *sampling distribution of x-bar* and *the margin of error*?
- If $\mu = 100$ and $\sigma = 10$ for a population, then the standard deviation of the sampling distribution of \bar{x} , where \bar{x} represents sample means for samples of size 100 taken from this population, will have a standard deviation $\sigma_{\bar{x}} = 10$.
 - The sampling distribution of \bar{x} follows a normal distribution with a standard error of $\sigma_{\bar{x}} = \sigma/\sqrt{n}$.
 - The sampling of \bar{x} can be used to compute the probability that \bar{x} will be within a given distance of μ .
 - Because the sampling distribution shows how values of \bar{x} are distributed around the population mean μ , the sampling distribution of \bar{x} provides information about the possible differences between \bar{x} and μ .
25. Which of the following statements is NOT true about the *margin of error*?
- When the sampling distribution of \bar{x} is normally distributed, 95% of the \bar{x} -bar values must be within $\pm 1.96\sigma_{\bar{x}}$ of the mean μ .
 - Everything else held constant, if the sample size n is increased from 100 to 400, the margin of error will increase.
 - If $\sigma_{\bar{x}} = 2$, we can conclude that 95% of all \bar{x} -bar values obtained using a sample size of $n = 400$ will be within ± 3.92 of the population mean μ .
 - Everything else held constant, if the confidence level is increased from 90% to 99%, the margin of error will increase.
26. Which of the following statements about *interval estimation* is NOT true?
- If the population follows a normal distribution, the confidence interval provided by expression $\bar{x} \pm (Z_{\alpha/2})(\sigma_{\bar{x}})$ is exact.
 - If the expression $\bar{x} \pm (Z_{\alpha/2})(\sigma_{\bar{x}})$ were used repeatedly to generate 95% confidence intervals for a normal population, exactly 95% of the intervals generated would contain the population mean.
 - If the population does not follow a normal distribution, the confidence interval provided by expression $\bar{x} \pm (Z_{\alpha/2})(\sigma_{\bar{x}})$ will be approximate.
 - If the population does not follow a normal distribution, the quality of the approximation of the sampling distribution of \bar{x} to the standard normal distribution depends on either the distribution of the population or the sample size, but not on both.
27. Which of the following is NOT true about *t distribution*?
- When s is used to estimate σ , the margin of error and the interval estimate for the population mean are based on a probability distribution known as the *t* distribution.
 - The *t* distribution is a family of similar probability distributions, with a specific *t* distribution depending on a parameter known as the degrees of freedom.
 - As the number of degrees of freedom increases, the difference between the *t* distribution and the standard normal distribution becomes larger.
 - The *t* distribution with one degree of freedom is unique, as the *t* distribution with two degrees of freedom.
28. Which of the following is NOT true about *t distribution*?

- a) A t distribution with more degrees of freedom shows less variability and more closely resembles the standard normal distribution.
- b) The mean of the t distribution is zero.
- c) $t_{.05}$ indicates that the t value provides a .025 area in the upper tail of a t distribution.
- d) A subscript is placed on t to indicate the area in the upper tail of the t distribution.
29. Which of the following is NOT true about *margin of error and the interval estimate*?
- a) To compute an interval estimate of μ for the σ unknown case, the sample standard deviation s is used to estimate σ , and $Z_{\alpha/2}$ is replaced by the t distribution value $t_{\alpha/2}$.
- b) The reason the number of degrees of freedom associated with the t value in the expression $\bar{x} \pm t_{\alpha/2}(s/\sqrt{n})$ is $n-1$ concerns the use of s as an estimate of the population standard deviation σ .
- c) The general formula for the interval estimate is $\bar{x} \pm$ margin of error.
- d) The general expression for an interval estimate of a population mean when σ is unknown is $\bar{x} \pm Z_{\alpha/2}(s/\sqrt{n})$.
30. Which of the following is NOT a practical advice about confidence interval estimation?
- a) If the population follows a normal distribution, the confidence interval provided by the expression $\bar{x} \pm t_{\alpha/2}(s/\sqrt{n})$ is exact and can be used for any sample size.
- b) If the population is not normally distributed but is roughly symmetric, sample sizes as small as fifteen can be expected to provide good approximate confidence intervals.
- c) If the population does not follow a normal distribution, the confidence interval provided by the general expression $\bar{x} \pm t_{\alpha/2}(s/\sqrt{n})$ will be approximate.
- d) Smaller sample sizes are needed if the distribution of the population is highly skewed or includes outliers.
31. Which of the following is NOT true about the use of t versus z distribution for confidence interval estimation?
- a) When σ is unknown, the margin of error, $t_{\alpha/2}(s/\sqrt{n})$, varies from sample to sample because the sample standard deviation s varies depending upon the sample selected.
- b) A small value for s provides a larger margin of error.
- c) When σ is known, the margin of error, $Z_{\alpha/2}(\sigma/\sqrt{n})$, is fixed and is the same for all samples of size n .
- d) A large value for s provides a larger margin of error.
32. What happens to confidence interval estimates when the population is skewed?
- a) When the population is skewed to the right with large data values stretching the distribution to the right, the sample mean \bar{x} and the sample standard deviation s are positively correlated.
- b) When the population is skewed to the right, larger values of s tend to be associated with larger values of \bar{x} .
- c) When \bar{x} is larger than the population mean, s tends to be larger than σ .
- d) All of the above.
33. What happens to confidence interval estimates when the population is skewed?
- a) Skewness causes the margin of error, $t_{\alpha/2}(s/\sqrt{n})$, to be larger than it would be with σ known.
- b) The confidence interval with the larger margin of error tends to include the population mean μ more often than it would if the true value of σ were used.
- c) When \bar{x} is smaller than the population mean, the correlation between \bar{x} and s causes the margin of error to be small.
- d) All of the above.
34. Which of the following is NOT true about determining the required sample size n ?
- a) If the value for σ is known, the sample size n needed to provide any desired margin of error can be determined.
- b) The equation $n = [(Z_{\alpha/2})^2 \sigma^2]/E^2$ can be used to predict how a variable x and a variable y are correlated.
- c) A planning value for the population standard deviation σ must be specified before the sample size can be determined.
- d) The equation $n = [(Z_{\alpha/2})^2 \sigma^2]/E^2$ can be used to determine the required sample size for computing a confidence interval with a given level of confidence in the estimate and a given level of margin of error.

35. In practice, the planning value for σ for determining the required sample size n for interval estimation of a population mean can be chosen by using any of the following procedures EXCEPT _____.
- Use the population mean and multiply it by 2 to find the planning value for σ .
 - Use judgment or a "best guess" for the value of σ .
 - Use the estimate of the population standard deviation computed from data of previous studies as the planning value for σ .
 - Use a pilot study to select a preliminary sample.
36. Which of the following statements is NOT true about hypothesis testing?
- Hypothesis testing can be used to determine whether a statement about the value of a population parameter should or should not be rejected.
 - In hypothesis testing a researcher can begin by making a tentative assumption about a population parameter.
 - A tentative assumption about a population parameter, called the null hypothesis, is denoted by H_0 .
 - The alternative hypothesis is an alternative way to support the same claim made in the null hypothesis H_0 .
37. Which of the following statements is NOT true about hypothesis testing?
- The hypothesis testing procedure uses data from a sample to test the two competing statements indicated by H_0 and H_a .
 - In research studies, the null and alternative hypotheses should be formulated so that the rejection of H_a supports the research conclusion, H_0 .
 - The conclusion that the research hypothesis is true is made if the sample data sufficiently contradict the null hypothesis.
 - In research studies, the null and alternative hypotheses should be formulated so that the rejection of H_0 supports the research conclusion, H_a .
38. Which of the following statements is NOT true about the null hypothesis, H_0 ?
- In research studies, the null and alternative hypotheses should be formulated so that the rejection of H_0 supports the research conclusion, H_a .
 - If the sample results indicate the H_0 can be rejected, researchers can make the inference that H_a is true.
 - A manufacturer's claim is usually given the benefit of the doubt and stated as the null hypothesis.
 - As a general guideline, a null hypothesis should be stated as the research hypothesis.
39. Which of the following statements is NOT true about the alternative hypothesis, H_a ?
- The alternative hypothesis about a population mean can take the form $H_a: \mu < \mu_0$.
 - The alternative hypothesis about a population mean can take the form $H_a: \mu = \mu_0$.
 - The alternative hypothesis about a population mean can take the form $H_a: \mu > \mu_0$.
 - The research hypothesis should be expressed as the alternative hypothesis.
40. Which of the following statements is NOT true about H_0 and H_a ?
- The equality part of the expression in a hypothesis (either \geq , \leq , or $=$) always appears in the research hypothesis.
 - A researcher should keep in mind that the alternative hypothesis is often what the test is attempting to establish.
 - The equality part of the expression in a hypothesis (either \geq , \leq , or $=$) always appears in the null hypothesis.
 - Asking whether the researcher is looking for evidence to support $\mu < \mu_0$, $\mu > \mu_0$, or $\mu \neq \mu_0$ will help determine H_a .
41. Which of the following statements is NOT true about Type I and Type II errors associated with hypothesis testing?
- Because hypothesis tests are based on sample information, researchers must allow for the possibility of errors.
 - Type I error occurs when one rejects a true H_0 .
 - The probability of Type II error are most commonly controlled by setting a low level of significance, α .
 - Type II error occurs when one fails to reject a false H_0 .

42. Which of the following statements is NOT true about type I and type II errors associated with hypothesis testing?
- The probability of making a Type I error when the null hypothesis is true as an equality is called the level of significance, α .
 - If the cost of making a Type I error is not too high, smaller values of α are typically used.
 - Because of the uncertainty associated with making a Type II error when conducting significance tests, statisticians often recommend using the statement "do not reject H_0 " instead of "accept H_0 ."
 - Applications of hypothesis testing that only control for the Type I error are often called significance tests, which are the most common applications of hypothesis testing.
43. Which of the following statements is NOT true about α ?
- If the cost of making a Type I error is high, larger values of α are preferred.
 - α is the probability of making a Type I error when the null hypothesis is true as an equality.
 - In practice, the person conducting the hypothesis test specifies the level of significance.
 - By selecting α , a researcher controls the probability of making a Type I error.
44. Which of the following statements is NOT true about one-tailed tests of hypothesis?
- A one-tailed test is a hypothesis test in which rejection of the null hypothesis occurs for values of the test statistic in one tail of its sampling distribution.
 - The rejection rule for a lower tail test of hypothesis can be stated as: Reject H_0 if $z \leq -z_\alpha$.
 - The rejection rule for a lower tail test of hypothesis can be stated as: Reject H_0 if $p\text{-value} \leq \alpha$.
 - The rejection rule for a lower tail test of hypothesis can be stated as: Reject H_0 if $z \geq -z_\alpha$.
45. Which of the following statements is true about the p-value approach of hypothesis testing?
- The p-value approach is better than the critical value approach because the researcher has a higher chance of being able to reject H_0 if the p-value approach is used.
 - The p-value approach is appropriate only for testing one-tailed hypotheses.
 - In practice, the p-value approach has become the preferred method of determining whether the H_0 can be rejected, especially when using computer software.
 - The p-value approach is appropriate only when the z statistic is used; it is not appropriate when the t statistic is used.
46. Which of the following statements is NOT true about the critical value approach of hypothesis testing?
- For a lower tail test of hypothesis, the rejection rule is: Reject H_0 if $z \leq -z_\alpha$.
 - The critical value depends on the level of significance α used in testing a hypothesis.
 - For a lower tail test of hypothesis, the rejection rule is: Reject H_0 if $z \geq z_\alpha$.
 - The critical value approach and the p-value approach must always lead to the same conclusion about rejection of H_0 .
47. Which of the following statements is NOT true about rejection rules that can be used to test a hypothesis?
- The rejection rule for testing a hypothesis can be developed using three possible approaches: the p-value approach, critical value approach, and confidence interval approach.
 - For an upper tail hypothesis, the rejection rule can be stated as: Reject H_0 if $p\text{-value} \leq \alpha$ or Reject H_0 if $z \geq z_\alpha$.
 - For a two-tailed hypothesis, the rejection rule can be stated as: if the confidence interval contains the hypothesized value μ_0 , do not reject H_0 ; otherwise, reject H_0
 - For a lower tail hypothesis, the rejection rule can be stated as: Reject H_0 if $p\text{-value} \leq \alpha$ or Reject H_0 if $z \leq -z_{\alpha/2}$.
48. Which of the following statements is NOT true about the p-value associated with hypothesis testing?

- a. Because a p-value cannot be computed exactly from the t table in your book, the p-value approach to testing hypotheses cannot at all be used when σ is unknown.
- b. A p-value less than .01 can be interpreted as indicating overwhelming evidence to conclude that H_0 is false and H_a is true.
- c. A p-value between .01 and .05 can be interpreted as an indication that there is strong evidence to conclude that H_0 is false and H_a is true.
- d. A p-value between .05 and .1 can be interpreted as an indication that there is weak evidence to conclude that H_0 is false and H_a is true.

49. Which of the following statements is true about the steps of hypothesis testing listed in your textbook?

- a. Step 3 of the five-step hypothesis testing procedure is to develop the null and alternative hypotheses.
- b. The critical value is used to compute the p-value.
- c. An alternative hypothesis about a population mean must contain one and only one of the three symbols: $<$, $>$, \neq and it must not contain any equality sign.
- d. The level of significance α cannot be used to determine the critical value and formulate the rejection rule.

50. Which of the following statements is NOT true about the relationship between confidence interval estimation and hypothesis testing?

- a. The confidence interval approach to testing a hypothesis is appropriate only when the hypothesis is a left-tailed hypothesis.
- b. If the confidence interval contains the hypothesized value μ_0 , do not reject H_0 ; otherwise, reject H_0 .
- c. The relationship between confidence intervals and hypothesis testing can be extended to one-tailed tests about population parameters. Doing so, however, requires the development of one-sided confidence intervals, which are rarely used in practice.
- d. The confidence interval approach to testing a hypothesis is appropriate when the hypothesis is a two-tailed hypothesis.