

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

Solve the problem.

- 1) The length of time a traffic signal stays green (nicknamed the "green time") at a particular intersection follows a normal probability distribution with a mean of 200 seconds and the standard deviation of 10 seconds. Use this information to answer the following questions. Which of the following describes the derivation of the sampling distribution of the sample mean?
 - A) The means of a large number of samples of size n randomly selected from the population of "green times" are calculated and their probabilities are plotted.
 - B) The standard deviations of a large number of samples of size n randomly selected from the population of "green times" are calculated and their probabilities are plotted.
 - C) The mean and median of a large randomly selected sample of "green times" are calculated. Depending on whether or not the population of "green times" is normally distributed, either the mean or the median is chosen as the best measurement of center.
 - D) A single sample of sufficiently large size is randomly selected from the population of "green times" and its probability is determined.
- 2) Which of the following describes what the property of unbiasedness means?
 - A) The shape of the sampling distribution is approximately normally distributed.
 - B) The center of the sampling distribution is found at the population standard deviation.
 - C) The center of the sampling distribution is found at the population parameter that is being estimated.
 - D) The sampling distribution in question has the smallest variation of all possible sampling distributions.
- 3) The Central Limit Theorem states that the sampling distribution of the sample mean is approximately normal under certain conditions. Which of the following is a necessary condition for the Central Limit Theorem to be used?
 - A) The sample size must be large (e.g., at least 30).
 - B) The population size must be large (e.g., at least 30).
 - C) The population from which we are sampling must be normally distributed.
 - D) The population from which we are sampling must not be normally distributed.
- 4) The Central Limit Theorem is important in statistics because _____.
 - A) for any size sample, it says the sampling distribution of the sample mean is approximately normal
 - B) for any population, it says the sampling distribution of the sample mean is approximately normal, regardless of the sample size
 - C) for a large n , it says the sampling distribution of the sample mean is approximately normal, regardless of the population
 - D) for a large n , it says the population is approximately normal
- 5) Which of the following statements about the sampling distribution of the sample mean is incorrect?
 - A) The sampling distribution is generated by repeatedly taking samples of size n and computing the sample means.
 - B) The standard deviation of the sampling distribution is σ .
 - C) The sampling distribution is approximately normal whenever the sample size is sufficiently large ($n \geq 30$).
 - D) The mean of the sampling distribution is μ .

Answer the question True or False.

- 6) As the sample size gets larger, the standard error of the sampling distribution of the sample mean gets larger as well.
 - A) True
 - B) False

- 7) The Central Limit Theorem guarantees that the population is normal whenever n is sufficiently large.
 A) True B) False
- 8) The standard error of the sampling distribution of the sample mean is equal to σ , the standard deviation of the population.
 A) True B) False

Solve the problem.

- 9) The daily revenue at a university snack bar has been recorded for the past five years. Records indicate that the mean daily revenue is \$1500 and the standard deviation is \$500. The distribution is skewed to the right due to several high volume days (football game days). Suppose that 100 days are randomly selected and the average daily revenue computed. Which of the following describes the sampling distribution of the sample mean?
 A) normally distributed with a mean of \$1500 and a standard deviation of \$500
 B) normally distributed with a mean of \$1500 and a standard deviation of \$50
 C) normally distributed with a mean of \$150 and a standard deviation of \$50
 D) skewed to the right with a mean of \$1500 and a standard deviation of \$500
- 10) Suppose students' ages follow a skewed right distribution with a mean of 23 years old and a standard deviation of 4 years. If we randomly sample 200 students, which of the following statements about the sampling distribution of the sample mean age is incorrect?
 A) The mean of the sampling distribution is approximately 23 years old.
 B) The standard deviation of the sampling distribution is equal to 4 years.
 C) The shape of the sampling distribution is approximately normal.
- 11) One year, the distribution of salaries for professional sports players had mean \$1.6 million and standard deviation \$0.7 million. Suppose a sample of 100 major league players was taken. Find the approximate probability that the average salary of the 100 players that year exceeded \$1.1 million.
 A) .7357 B) approximately 1 C) .2357 D) approximately 0

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

- 12) The weight of corn chips dispensed into a 10-ounce bag by the dispensing machine has been identified as possessing a normal distribution with a mean of 10.5 ounces and a standard deviation of .2 ounce. Suppose 100 bags of chips are randomly selected. Find the probability that the mean weight of these 100 bags exceeds 10.45 ounces.

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

- 13) A random sample of $n = 600$ measurements is drawn from a binomial population with probability of success .08. Give the mean and the standard deviation of the sampling distribution of the sample proportion, \hat{p} .
 A) .08; .011 B) .92; .003 C) .08; .003 D) .92; .011
- 14) A random sample of $n = 300$ measurements is drawn from a binomial population with probability of success .43. Give the mean and the standard deviation of the sampling distribution of the sample proportion, \hat{p} .
 A) .57; .029 B) .43; .014 C) .57; .014 D) .43; .029

- 15) Which statement best describes a parameter?
- A) A parameter is a level of confidence associated with an interval about a sample mean or proportion.
 - B) A parameter is a numerical measure of a population that is almost always unknown and must be estimated.
 - C) A parameter is a sample size that guarantees the error in estimation is within acceptable limits.
 - D) A parameter is an unbiased estimate of a statistic found by experimentation or polling.
- 16) A study was conducted to determine what proportion of all college students considered themselves as full-time students. A random sample of 300 college students was selected and 210 of the students responded that they considered themselves full-time students. Which of the following would represent the target parameter of interest?
- A) μ
 - B) p
- 17) What is the confidence level of the following confidence interval for μ ?
- $$\bar{x} \pm 2.33 \left(\frac{\sigma}{\sqrt{n}} \right)$$
- A) 233%
 - B) 67%
 - C) 98%
 - D) 78%
- 18) A 90% confidence interval for the mean percentage of airline reservations being canceled on the day of the flight is (1.1%, 3.2%). What is the point estimator of the mean percentage of reservations that are canceled on the day of the flight?
- A) 1.05%
 - B) 2.15%
 - C) 2.1%
 - D) 1.60%
- 19) Suppose a large labor union wishes to estimate the mean number of hours per month a union member is absent from work. The union decides to sample 468 of its members at random and monitor the working time of each of them for 1 month. At the end of the month, the total number of hours absent from work is recorded for each employee. Which of the following should be used to estimate the parameter of interest for this problem?
- A) A large sample confidence interval for p .
 - B) A small sample confidence interval for p .
 - C) A small sample confidence interval for μ .
 - D) A large sample confidence interval for μ .

Provide an appropriate response.

- 20) After conducting a survey, a researcher wishes to cut the standard error (and thus the margin of error) to $\frac{1}{3}$ of its original value. How will the necessary sample size change?
- A) It will decrease by a factor of 9.
 - B) It will increase by a factor of 3.
 - C) It will increase by a factor of 9.
 - D) It will decrease by a factor of 3.
 - E) Not enough information is given.
- 21) The real estate industry claims that it is the best and most effective system to market residential real estate. A survey of randomly selected home sellers in Illinois found that a 95% confidence interval for the proportion of homes that are sold by a real estate agent is 69% to 81%. Interpret the interval in this context.
- A) In 95% of the years, between 69% and 81% of homes in Illinois are sold by a real estate agent.
 - B) 95% of all random samples of home sellers in Illinois will show that between 69% and 81% of homes are sold by a real estate agent.
 - C) If you sell a home in Illinois, you have an $75\% \pm 6\%$ chance of using a real estate agent.
 - D) We are 95% confident that between 69% and 81% of homes in this survey are sold by a real estate agent.
 - E) We are 95% confident, based on this sample, that between 69% and 81% of all homes in Illinois are sold by a real estate agent.

- 22) The real estate industry claims that it is the best and most effective system to market residential real estate. A survey of randomly selected home sellers in Illinois found that a 99% confidence interval for the proportion of homes that are sold by a real estate agent is 70% to 80%. Explain what "99% confidence" means in this context.
- A) In 99% of the years, between 70% and 80% of homes in Illinois are sold by a real estate agent.
 - B) About 99% of all random samples of home sellers in Illinois will produce a confidence interval that contains the true proportion of homes sold by a real estate agent.
 - C) There is a 99% chance that the true proportion of home sellers in Illinois who sell their home with a real estate agent is between 70% and 80%.
 - D) 99% of home sellers in Illinois will sell their home with a real estate agent between 70% and 80% of the time.
 - E) About 99% of all random samples of home sellers in Illinois will find that between 70% and 80% of homes are sold by a real estate agent.

Answer the question True or False.

- 23) The confidence level is the confidence coefficient expressed as a percentage.
- A) True
 - B) False

Solve the problem.

- 24) A random sample of 250 students at a university finds that these students take a mean of 14.3 credit hours per quarter with a standard deviation of 1.7 credit hours. The 95% confidence interval for the mean is 14.3 ± 0.211 . Interpret the interval.
- A) 95% of the students take between 14.089 to 14.511 credit hours per quarter.
 - B) We are 95% confident that the average number of credit hours per quarter of students at the university falls in the interval 14.089 to 14.511 hours.
 - C) We are 95% confident that the average number of credit hours per quarter of the sampled students falls in the interval 14.089 to 14.511 hours.
 - D) The probability that a student takes 14.089 to 14.511 credit hours in a quarter is 0.95.
- 25) A random sample of 250 students at a university finds that these students take a mean of 15.3 credit hours per quarter with a standard deviation of 1.6 credit hours. Estimate the mean credit hours taken by a student each quarter using a 95% confidence interval. Round to the nearest thousandth.
- A) $15.3 \pm .198$
 - B) $15.3 \pm .010$
 - C) $15.3 \pm .157$
 - D) $15.3 \pm .013$
- 26) Parking at a large university can be extremely difficult at times. One particular university is trying to determine the location of a new parking garage. As part of their research, officials are interested in estimating the average parking time of students from within the various colleges on campus. A survey of 338 College of Business (COBA) students yields the following descriptive information regarding the length of time (in minutes) it took them to find a parking spot. Note that the "Lo 95%" and "Up 95%" refer to the endpoints of the desired confidence interval.

Variable	N	Lo 95% CI	Mean	Up 95% CI	SD
Parking Time	338	9.1944	10.466	11.738	11.885

Explain what the phrase "95% confident" means when working with a 95% confidence interval.

- A) In repeated sampling, 95% of the population means will fall within the interval created.
- B) In repeated sampling, 95% of the intervals created will contain the population mean.
- C) 95% of the observations in the population will fall within the endpoints of the interval.
- D) In repeated sampling, 95% of the sample means will fall within the interval created.

- 27) An educator wanted to look at the study habits of university students. As part of the research, data was collected for three variables - the amount of time (in hours per week) spent studying, the amount of time (in hours per week) spent playing video games and the GPA - for a sample of 20 male university students. As part of the research, a 95% confidence interval for the average GPA of all male university students was calculated to be: (2.95, 3.10). Which of the following statements is true?
- A) In construction of the confidence interval, a t-value with 20 degrees of freedom was used.
 - B) In construction of the confidence interval, a z-value was used.
 - C) In construction of the confidence interval, a t-value with 19 degrees of freedom was used.
 - D) In construction of the confidence interval, a z-value with 20 degrees of freedom was used.
- 28) Find the value of t_0 such that the following statement is true: $P(-t_0 \leq t \leq t_0) = .95$ where $df = 15$.
- A) 2.602
 - B) 2.947
 - C) 2.131
 - D) 1.753
- 29) Fifteen SmartCars were randomly selected and the highway mileage of each was noted. The analysis yielded a mean of 47 miles per gallon and a standard deviation of 5 miles per gallon. Which of the following would represent a 90% confidence interval for the average highway mileage of all SmartCars?
- A) $47 \pm 1.345 \frac{5}{\sqrt{15}}$
 - B) $47 \pm 1.645 \frac{5}{\sqrt{15}}$
 - C) $47 \pm 1.753 \frac{5}{\sqrt{15}}$
 - D) $47 \pm 1.761 \frac{5}{\sqrt{15}}$
- 30) How much money does the average professional football fan spend on food at a single football game? That question was posed to 10 randomly selected football fans. The sample results provided a sample mean and standard deviation of \$14.00 and \$2.50, respectively. Use this information to construct a 90% confidence interval for the mean.
- A) $14 \pm 1.383(2.50/\sqrt{10})$
 - B) $14 \pm 1.833(2.50/\sqrt{10})$
 - C) $14 \pm 1.812(2.50/\sqrt{10})$
 - D) $14 \pm 1.796(2.50/\sqrt{10})$
- 31) A computer package was used to generate the following printout for estimating the mean sale price of homes in a particular neighborhood.

X = sale_price

SAMPLE MEAN OF X =	46,600
SAMPLE STANDARD DEV =	13,747
SAMPLE SIZE OF X =	15
CONFIDENCE =	95
UPPER LIMIT =	54,213.60
SAMPLE MEAN OF X =	46,600
LOWER LIMIT =	38,986.40

A friend suggests that the mean sale price of homes in this neighborhood is \$48,000. Comment on your friend's suggestion.

- A) Your friend is correct, and you are 95% certain.
- B) Your friend is wrong, and you are 95% certain.
- C) Your friend is correct, and you are 100% certain.
- D) Based on this printout, all you can say is that the mean sale price might be \$48,000.

- 32) An educator wanted to look at the study habits of university students. As part of the research, data was collected for three variables - the amount of time (in hours per week) spent studying, the amount of time (in hours per week) spent playing video games and the GPA - for a sample of 20 male university students. As part of the research, a 95% confidence interval for the average GPA of all male university students was calculated to be: (2.95, 3.10). What assumption is necessary for the confidence interval analysis to work properly?
- A) The Central Limit theorem guarantees that no assumptions about the population are necessary.
 - B) The sampling distribution of the sample mean needs to be approximately normally distributed.
 - C) The population that we are sampling from needs to be approximately normally distributed.
 - D) The population that we are sampling from needs to be a t-distribution with $n - 1$ degrees of freedom.
- 33) What type of car is more popular among college students, American or foreign? One hundred fifty-nine college students were randomly sampled and each was asked which type of car he or she prefers. A computer package was used to generate the printout below for the proportion of college students who prefer American automobiles.

SAMPLE PROPORTION = .396226
SAMPLE SIZE = 159

UPPER LIMIT = .46492
LOWER LIMIT = .331153

Is the sample large enough for the interval to be valid?

- A) Yes, since $n > 30$.
 - B) No, the population of college students is not normally distributed.
 - C) Yes, since $n\hat{p}$ and $n\hat{q}$ are both greater than 15.
 - D) No, the sample size should be at 5% of the population.
- 34) A university dean is interested in determining the proportion of students who receive some sort of financial aid. Rather than examine the records for all students, the dean randomly selects 200 students and finds that 118 of them are receiving financial aid. Use a 95% confidence interval to estimate the true proportion of students who receive financial aid.
- A) $.59 \pm .474$ B) $.59 \pm .068$ C) $.59 \pm .005$ D) $.59 \pm .002$
- 35) A confidence interval was used to estimate the proportion of statistics students who are female. A random sample of 72 statistics students generated the following confidence interval: (.438, .642). Using the information above, what sample size would be necessary if we wanted to estimate the true proportion to within 3% using 99% reliability?
- A) 1916 B) 1831 C) 1769 D) 1842
- 36) Sales of a new line of athletic footwear are crucial to the success of a company. The company wishes to estimate the average weekly sales of the new footwear to within \$300 with 90% reliability. The initial sales indicate that the standard deviation of the weekly sales figures is approximately \$1100. How many weeks of data must be sampled for the company to get the information it desires?
- A) 7 weeks B) 37 weeks C) 23 weeks D) 10,915 weeks
- 37) The director of a hospital wishes to estimate the mean number of people who are admitted to the emergency room during a 24-hour period. The director randomly selects 64 different 24-hour periods and determines the number of admissions for each. For this sample, $\bar{x} = 19.8$ and it is known that $\sigma^2 = 4$. If the director wishes to estimate the mean number of admissions per 24-hour period to within 1 admission with 90% reliability, what is the minimum sample size she should use?
- A) 11 B) 7 C) 44 D) 27

Write the null and alternative hypotheses you would use to test the following situation.

- 38) 5% of trucks of a certain model have needed new engines after being driven between 0 and 100 miles. The manufacturer hopes that the redesign of one of the engine's components has solved this problem.

A) $H_0: p = 0.05$ B) $H_0: p < 0.05$ C) $H_0: p < 0.05$ D) $H_0: p = 0.05$ E) $H_0: p > 0.05$
 $H_A: p > 0.05$ $H_A: p = 0.05$ $H_A: p > 0.05$ $H_A: p < 0.05$ $H_A: p = 0.05$

- 39) The U.S. Department of Labor and Statistics released the current unemployment rate of 5.3% for the month in the U.S. and claims the unemployment has not changed in the last two months. However, the state's statistics reveal that there is a change in U.S. unemployment rate. What are the null and alternative hypotheses?

A) $H_0: p > 0.053$
 $H_A: p < 0.053$
B) $H_0: p = 0.053$
 $H_A: p > 0.053$
C) $H_0: p \neq 0.053$
 $H_A: p = 0.053$
D) $H_0: p = 0.053$
 $H_A: p \neq 0.053$
E) $H_0: p < 0.053$
 $H_A: p = 0.053$

Write the null and alternative hypothesis.

- 40) You are considering moving to Atlanta, and are concerned about the average one-way commute time. Does the average one-way commute time exceed 25 minutes? You take a random sample of 50 Atlanta residents and find an average commute time of 29 minutes with a standard deviation of 7 minutes.

A) $H_0: \mu = 25$ B) $H_0: \mu = 29$ C) $H_0: \mu = 25$ D) $H_0: \mu = 29$ E) $H_0: \mu = 25$
 $H_A: \mu > 25$ $H_A: \mu < 29$ $H_A: \mu \neq 25$ $H_A: \mu > 29$ $H_A: \mu < 25$

- 41) Suzie has installed a new spam blocker program on her email. She used to receive an average of 20 spam emails a day. Is the new program working?

A) $H_0: \mu = 20$
 $H_A: \mu < 20$
B) $H_0: \mu > 20$
 $H_A: \mu = 20$
C) $H_0: \mu = 20$
 $H_A: \mu > 20$
D) $H_0: \mu = 20$
 $H_A: \mu \neq 20$
E) Not enough information is given.

Solve the problem.

- 42) Researchers have claimed that the average number of headaches per student during a semester of Statistics is 11. Statistics students believe the average is higher. In a sample of $n = 16$ students the mean is 12 headaches with a deviation of 2.4. Which of the following represent the null and alternative hypotheses necessary to test the students' belief?

A) $H_0: \mu = 11$ vs. $H_a: \mu \neq 11$ B) $H_0: \mu = 11$ vs. $H_a: \mu < 11$
C) $H_0: \mu < 11$ vs. $H_a: \mu = 11$ D) $H_0: \mu = 11$ vs. $H_a: \mu > 11$

- 43) An insurance company sets up a statistical test with a null hypothesis that the average time for processing a claim is 7 days, and an alternative hypothesis that the average time for processing a claim is greater than 7 days. After completing the statistical test, it is concluded that the average time exceeds 7 days. However, it is eventually learned that the mean process time is really 7 days. What type of error occurred in the statistical test?
- A) Type II error
B) Type III error
C) No error occurred in the statistical sense.
D) Type I error
- 44) Suppose we wish to test $H_0: \mu = 40$ vs. $H_a: \mu > 40$. What will result if we conclude that the mean is greater than 40 when its true value is really 47?
- A) a Type I error
B) a correct decision
C) a Type II error
D) none of the above

For the given hypothesis test, explain the meaning of a Type I error or a Type II error, as specified.

- 45) In the past, the mean battery life for a certain type of flashlight battery has been 9.4 hours. The manufacturer has introduced a change in the production method and wants to perform a hypothesis test to determine whether the mean battery life has increased as a result. The hypotheses are:
- $H_0: \mu = 9.4$ hours
 $H_A: \mu > 9.4$ hours

Explain the result of a Type II error.

- A) The manufacturer will decide the mean battery life is greater than 9.4 hours when in fact it is greater than 9.4 hours.
B) The manufacturer will decide the mean battery life is 9.4 hours when in fact it is 9.4 hours.
C) The manufacturer will decide the mean battery life is less than 9.4 hours when in fact it is greater than 9.4 hours.
D) The manufacturer will decide the mean battery life is 9.4 hours when in fact it is greater than 9.4 hours.
E) The manufacturer will decide the mean battery life is greater than 9.4 hours when in fact it is 9.4 hours.

Solve the problem.

- 46) The State Association of Retired Teachers has recently taken flak from some of its members regarding the poor choice of the association's name. The association's by-laws require that more than 60 percent of the association must approve a name change. Rather than convene a meeting, it is first desired to use a sample to determine if meeting is necessary. Suppose the association decided to conduct a test of hypothesis using the following null and alternative hypotheses:

$$H_0: p = 0.6$$

$$H_A: p > 0.6$$

Define a Type II Error in the context of this problem.

- A) They conclude that exactly 60% of the association wants a name change when that is, in fact, true.
B) They conclude that exactly 60% of the association wants a name change when, in fact, that is not true.
C) They conclude that more than 60% of the association wants a name change when that is, in fact, true.
D) They conclude that more than 60% of the association wants a name change when, in fact, that is not true.

Find the rejection region for the specified hypothesis test.

- 47) Consider a test of $H_0: \mu = 6$. For the following case, give the rejection region for the test in terms of the z-statistic: $H_a: \mu \neq 6$, $\alpha = 0.10$
- A) $|z| > 1.28$
B) $z > 1.28$
C) $z > 1.645$
D) $|z| > 1.645$

Solve the problem.

- 48) How many tissues should a package of tissues contain? Researchers have determined that a person uses an average of 40 tissues during a cold. Suppose a random sample of 10,000 people yielded the following data on the number of tissues used during a cold: $\bar{x} = 31$, $s = 18$. Using the sample information provided, set up the calculation for the test statistic for the relevant hypothesis test, but do not simplify.

A) $z = \frac{31 - 40}{\frac{18^2}{10,000}}$

B) $z = \frac{31 - 40}{18}$

C) $z = \frac{31 - 40}{\frac{18}{\sqrt{10,000}}}$

D) $z = \frac{31 - 40}{\frac{18}{10,000^2}}$

- 49) Consider a test of $H_0: \mu = 60$ performed with the computer. SPSS reports a two-tailed p-value of 0.0892. Make the appropriate conclusion for the given situation: $H_a: \mu < 60$, $z = -1.7$, $\alpha = 0.05$

A) Fail to reject H_0

B) Reject H_0

- 50) Given $H_0: \mu = 25$, $H_a: \mu \neq 25$, and $p = 0.029$. Do you reject or fail to reject H_0 at the .01 level of significance?

A) fail to reject H_0

B) reject H_0

C) not sufficient information to decide

- 51) A bottling company produces bottles that hold 12 ounces of liquid. Periodically, the company gets complaints that their bottles are not holding enough liquid. To test this claim, the bottling company randomly samples 64 bottles and finds the average amount of liquid held by the bottles is 11.9155 ounces with a standard deviation of 0.40 ounce. Suppose the p-value of this test is 0.0455. State the proper conclusion.

A) At $\alpha = 0.025$, reject the null hypothesis.

B) At $\alpha = 0.05$, accept the null hypothesis.

C) At $\alpha = 0.05$, reject the null hypothesis.

D) At $\alpha = 0.10$, fail to reject the null hypothesis.

- 52) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was \$215.00. A random sample of cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than \$215.00. The information was entered into a spreadsheet and the following printout was obtained:

One-Sample T Test

Null Hypothesis: $\mu = 215$

Alternative Hyp: $\mu > 215$

95% Conf Interval							
Variable	Mean	SE	Lower	Upper	T	DF	P
Camera Price	245.23	15.620	212.740	277.720	1.94	21	0.0333

Cases Included 22

Use the p- value given above to determine which of the following conclusions is correct.

- A) At $\alpha = 0.10$, there is insufficient evidence to indicate that the mean price of all digital cameras exceeds \$215.00
 - B) At $\alpha = 0.01$, there is sufficient evidence to indicate that the mean price of all digital cameras exceeds \$215.00
 - C) At $\alpha = 0.05$, there is insufficient evidence to indicate that the mean price of all digital cameras exceeds \$215.00
 - D) At $\alpha = 0.03$, there is insufficient evidence to indicate that the mean price of all digital cameras exceeds \$215.00
- 53) A large university is interested in learning about the average time it takes students to drive to campus. The university sampled 238 students and asked each to provide the amount of time they spent traveling to campus. This variable, travel time, was then used to create a confidence interval and to conduct a test of hypothesis, both of which are shown in the printout below.

One-Sample Z Test

Null Hypothesis: $\mu = 20$

Alternative Hyp: $\mu > 20$

95% Conf Interval							
Variable	Mean	SE	Lower	Upper	Z	P	
Camera Price	23.243	1.3133	20.669	25.817	2.47	0.0071	

Cases Included 238

What conclusion can be made from the test of hypothesis conducted in this printout? Begin each answer with, "When testing at $\alpha = 0.01$..."

- A) ...there is sufficient evidence to indicate that the average travel time of all students exceeds 20 minutes.
- B) ...there is sufficient evidence to indicate that the average travel time of all students is equal to 20 minutes.
- C) ...there is insufficient evidence to indicate that the average travel time of all students is equal to 20 minutes.
- D) ...there is insufficient evidence to indicate that the average travel time of all students exceeds 20 minutes.

- 54) If a hypothesis test were conducted using $\alpha = 0.05$, to which of the following p -values would cause the null hypothesis to be rejected.
- A) 0.055 B) 0.100 C) 0.040 D) 0.060
- 55) A large university is interested in learning about the average time it takes students to drive to campus. The university sampled 238 students and asked each to provide the amount of time they spent traveling to campus. This variable, travel time, was then used to conduct a test of hypothesis. The goal was to determine if the average travel time of all the university's students differed from 20 minutes. Suppose the large-sample test statistic was calculated to be $z = 2.14$. Find the p -value for this test of hypothesis.
- A) $p = 0.4838$ B) $p = 0.0162$ C) $p = 0.0324$ D) $p = 0.9838$
- 56) We have created a 99% confidence interval for μ with the result (10, 15). What conclusion will we make if we test $H_0: \mu = 17$ vs. $H_a: \mu \neq 17$ at $\alpha = .01$?
- A) Reject H_0 in favor of H_a .
 B) Fail to reject H_0 .
 C) Accept H_0 rather than H_a .
 D) We cannot tell what our decision will be with the information given.
- 57) A national organization has been working with utilities throughout the nation to find sites for large wind machines that generate electricity. Wind speeds must average more than 19 miles per hour (mph) for a site to be acceptable. Recently, the organization conducted wind speed tests at a particular site. Based on a sample of $n = 45$ wind speed recordings (taken at random intervals), the wind speed at the site averaged $\bar{x} = 19.9$ mph, with a standard deviation of $s = 4.5$ mph. To determine whether the site meets the organization's requirements, consider the test, $H_0: \mu = 19$ vs. $H_a: \mu > 19$, where μ is the true mean wind speed at the site and $\alpha = .01$. Suppose the value of the test statistic were computed to be 1.34. State the conclusion.
- A) At $\alpha = .01$, there is insufficient evidence to conclude the true mean wind speed at the site exceeds 19 mph.
 B) We are 99% confident that the site meets the organization's requirements.
 C) At $\alpha = .01$, there is sufficient evidence to conclude the true mean wind speed at the site exceeds 19 mph.
 D) We are 99% confident that the site does not meet the organization's requirements.
- 58) A large university is interested in learning about the average time it takes students to drive to campus. The university sampled 238 students and asked each to provide the amount of time they spent traveling to campus. This variable, travel time, was then used to conduct a test of hypothesis. The goal was to determine if the average travel time of all the university's students differed from 20 minutes. Find the large-sample rejection region for the test of interest to the college when using a level of significance of 0.05.
- A) Reject H_0 if $z > 1.645$. B) Reject H_0 if $z < -1.645$ or $z > 1.645$.
 C) Reject H_0 if $z < -1.96$. D) Reject H_0 if $z < -1.96$ or $z > 1.96$.
- 59) A local eat-in pizza restaurant wants to investigate the possibility of starting to deliver pizzas. The owner of the store has determined that home delivery will be successful only if the average time spent on a delivery does not exceed 36 minutes. The owner has randomly selected 21 customers and delivered pizzas to their homes in order to test whether the mean delivery time actually exceeds 36 minutes. What assumption is necessary for this test to be valid?
- A) The population variance must equal the population mean.
 B) None. The Central Limit Theorem makes any assumptions unnecessary.
 C) The sample mean delivery time must equal the population mean delivery time.
 D) The population of delivery times must have a normal distribution.

60) A local eat-in pizza restaurant wants to investigate the possibility of starting to deliver pizzas. The owner of the store has determined that home delivery will be successful only if the average time spent on a delivery does not exceed 40 minutes. The owner has randomly selected 17 customers and delivered pizzas to their homes in order to test whether the mean delivery time actually exceeds 40 minutes. Suppose the p -value for the test was found to be .0293. State the correct conclusion.

- A) At $\alpha = .03$, we fail to reject H_0 .
 B) At $\alpha = .05$, we fail to reject H_0 .
 C) At $\alpha = .025$, we fail to reject H_0 .
 D) At $\alpha = .02$, we reject H_0 .

61) An industrial supplier has shipped a truckload of teflon lubricant cartridges to an aerospace customer. The customer has been assured that the mean weight of these cartridges is in excess of the 13 ounces printed on each cartridge. To check this claim, a sample of $n = 21$ cartridges are randomly selected from the shipment and carefully weighed. Summary statistics for the sample are: $\bar{x} = 13.11$ ounces, $s = .21$ ounce. To determine whether the supplier's claim is true, consider the test, $H_0: \mu = 13$ vs. $H_a: \mu > 13$, where μ is the true mean weight of the cartridges. Calculate the value of the test statistic.

- A) 11.000
 B) 2.400
 C) 1.100
 D) 0.524

62) A consumer product magazine recently ran a story concerning the increasing prices of digital cameras. The story stated that digital camera prices dipped a couple of years ago, but now are beginning to increase in price because of added features. According to the story, the average price of all digital cameras a couple of years ago was \$215.00. A random sample of $n = 22$ cameras was recently taken and entered into a spreadsheet. It was desired to test to determine if that average price of all digital cameras is now more than \$215.00. Find a rejection region appropriate for this test if we are using $\alpha = 0.05$.

- A) Reject H_0 if $t > 1.725$
 B) Reject H_0 if $t > 2.080$ or $t < -2.080$
 C) Reject H_0 if $t > 1.721$
 D) Reject H_0 if $t > 1.717$

For the given binomial sample size and null-hypothesized value of p_0 , determine whether the sample size is large enough to use the normal approximation methodology to conduct a test of the null hypothesis $H_0: p = p_0$.

63) $n = 65$, $p_0 = 0.8$

- A) Yes
 B) No

Solve the problem.

64) The business college computing center wants to determine the proportion of business students who have laptop computers. If the proportion differs from 25%, then the lab will modify a proposed enlargement of its facilities. Suppose a hypothesis test is conducted and the test statistic is 2.4. Find the p -value for a two-tailed test of hypothesis.

- A) .0164
 B) .4918
 C) .4836
 D) .0082

65) A company claims that 9 out of 10 doctors (i.e., 90%) recommend its brand of cough syrup to their patients. To test this claim against the alternative that the actual proportion is less than 90%, a random sample of 100 doctors was chosen which resulted in 94 who indicate that they recommend this cough syrup. The test statistic in this problem is approximately:

- A) 1.67
 B) 1.33
 C) 1.83
 D) -1.33

66) A company claims that 9 out of 10 doctors (i.e., 90%) recommend its brand of cough syrup to their patients. To test this claim against the alternative that the actual proportion is less than 90%, a random sample of doctors was taken. Suppose the test statistic is $z = -2.30$. Can we conclude that H_0 should be rejected at the a) $\alpha = .10$,

b) $\alpha = .05$, and c) $\alpha = .01$ level?

- A) a) yes; b) yes; c) no
 B) a) no; b) no; c) no
 C) a) yes; b) yes; c) yes
 D) a) no; b) no; c) yes

- 67) A small private college is interested in determining the percentage of its students who live off campus and drive to class. Specifically, it was desired to determine if less than 20% of their current students live off campus and drive to class. A sample of 108 students was randomly selected and the following printout was obtained:

Hypothesis Test - One Proportion

Sample Size	108
Successes	16
Proportion	0.14815
Null Hypothesis:	$P = 0.2$
Alternative Hyp:	$P < 0.2$
Difference	-0.05185
Standard Error	0.03418
Z	-1.35
p-value	0.0885

Based on the information contained in the printout, what conclusion would be correct when testing at $\alpha = 0.05$.

- A) Accept H_A B) Reject H_0 C) Accept H_0 D) Fail to reject H_0
- 68) I want to test $H_0: p = .7$ vs. $H_A: p \neq .7$ using a test of hypothesis. This test would be called a(n) _____ test.
A) lower-tailed B) upper-tailed C) two-tailed D) one-tailed

Provide an appropriate response.

- 69) A state university wants to increase its retention rate of 4% for graduating students from the previous year. After implementing several new programs during the last two years, the university reevaluates its retention rate and comes up with a P-value of 0.075. What is reasonable to conclude about the new programs?
- A) We can say there is a 7.5% chance of seeing the new programs having no effect on retention in the results we observed from natural sampling variation. There is no evidence the new programs are more effective, but we cannot conclude the new programs have no effect on retention.
- B) There is a 92.5% chance of the new programs having no effect on retention.
- C) There's only a 7.5% chance of seeing the new programs having no effect on retention in the results we observed from natural sampling variation. We conclude the new programs are more effective.
- D) We can say there is a 7.5% chance of seeing the new programs having an effect on retention in the results we observed from natural sampling variation. We conclude the new programs are more effective.
- E) There is a 7.5% chance of the new programs having no effect on retention.
- 70) A new manager, hired at a large warehouse, was told to reduce the 26% employee sick leave. The manager introduced a new incentive program for employees with perfect attendance. The manager decides to test the new program to see if it's better and receives a P-value of 0.06. What is reasonable to conclude about the new strategy?
- A) There is a 94% chance of the new program having no effect on employee attendance.
- B) There's only a 6% chance of seeing the new program having no effect on employee attendance in the results we observed from natural sampling variation. We conclude the new program is more effective.
- C) There is a 6% chance of the new program having no effect on employee attendance.
- D) We can say there is a 6% chance of seeing the new program having no effect on employee attendance in the results we observed from natural sampling variation. There is no evidence the new program is more effective, but we cannot conclude the program has no effect on employee attendance.
- E) We can say there is a 6% chance of seeing the new program having no effect on employee attendance in the results we observed from natural sampling variation. We conclude the new program is more effective.

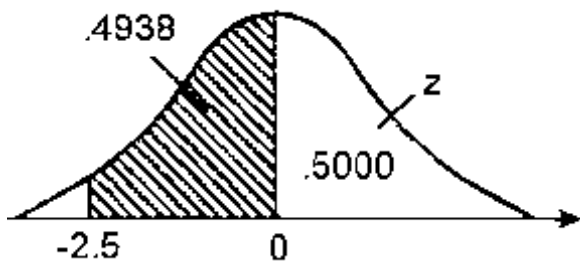
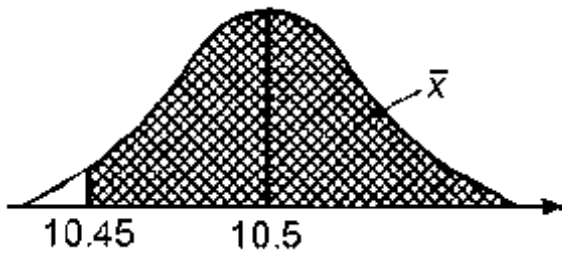
Answer Key

Testname: PRACTICE CH 5-7 STT315

- 1) A
- 2) C
- 3) A
- 4) C
- 5) B
- 6) B
- 7) B
- 8) B
- 9) B
- 10) B
- 11) B

$$12) P(\bar{x} > 10.45) = P\left[z > \frac{10.45 - 10.50}{.2/\sqrt{100}}\right]$$

$$= P(z > -2.5) = .5 + .4938 = .9938$$



- 13) A
- 14) D
- 15) B
- 16) B
- 17) C
- 18) B
- 19) D
- 20) C
- 21) E
- 22) B
- 23) A
- 24) B
- 25) A
- 26) B
- 27) C
- 28) C

Answer Key

Testname: PRACTICE CH 5-7 STT315

- 29) D
- 30) B
- 31) D
- 32) C
- 33) C
- 34) B
- 35) B
- 36) B
- 37) A
- 38) D
- 39) D
- 40) A
- 41) A
- 42) D
- 43) D
- 44) B
- 45) D
- 46) B
- 47) D
- 48) C
- 49) B
- 50) A
- 51) C
- 52) D
- 53) A
- 54) C
- 55) C
- 56) A
- 57) A
- 58) D
- 59) D
- 60) C
- 61) B
- 62) C
- 63) B
- 64) A
- 65) B
- 66) A
- 67) D
- 68) C
- 69) A
- 70) D