

1. The sample mean,  $\bar{x}$  is called a \_\_\_\_\_ of the population mean  $\mu$ .
  - a) Point estimate
  - b) Margin of error
  - c) Critical z-value
  - d) Confidence level
  - e) Interval estimate
2. The standard deviation of SAT scores is 100 points. A researcher decides to take a sample of 500 students' scores to estimate the mean score of students in your state. What is the standard deviation of the sample mean?
  - a) .2
  - b) 4.47
  - c) 5
  - d) 100
  - e) Cannot be determined without sample mean
3. The 99.7% confidence interval for the mean length of frog jumps is (12.64 cm, 14.44 cm). Which of the following statements is a correct interpretation of 99.7% confidence.
  - a) Of the total number of frogs in your area of the country, 99.7% can jump between 12.64 cm and 14.44 cm.
  - b) There's a 99.7% chance that the mean length of frog jumps falls between 12.64cm and 14.44 cm.
  - c) If we were to repeat this sampling many times, 99.7% of the confidence intervals we could construct would contain the true population mean.
  - d) 99.7% of the confidence intervals we could construct after repeated sampling would go from 12.64 cm to 14.44 cm.
  - e) There's a 99.7% chance that any particular frog I catch can jump between 12.64 cm and 14.44 cm.
4. True or False: A 95% confidence interval is narrower than a 90% confidence interval for the same data set.
5. What's the critical z-value for an 85% confidence interval?
  - a) .8023
  - b) 1.44
  - c) 1.04
  - d) Cannot be determined without knowing the population standard deviation
  - e) Cannot be determined without knowing the sample size
6. True or False: Increasing the sample size will decrease the margin of error in your confidence interval.
7. You have a table of standard normal probabilities that gives you the area of the curve from the left tail to the z-score of interest. When using this type of table, what area of the curve would you use to find the corresponding z-score for confidence interval of 95%?
  - a) .05
  - b) .90
  - c) .95
  - d) .975
  - e) 2.0
8. You want to compute a 90% confidence interval for the mean of a population with unknown population standard deviation. The sample size is 30. The value of  $t^*$  you would use for this interval is
  - a) 1.96
  - b) 1.645
  - c) 1.699
  - d) 0.90
  - e) 1.311

9. A 95% confidence interval for the mean reading achievement score for a population of third-grade students is (44.2, 54.2). Suppose you compute a 99% confidence interval using the same information. Which of the following statements is correct?
- The intervals have the same width.
  - The 99% interval is shorter.
  - The 99% interval is longer.
  - The answer cannot be determined from the information given.
  - None of the above.
10. A researcher computes a 90% confidence interval for the mean weight (in lb) of widgets produced in a factory. The interval is (7.2, 8.9). Which of these is a correct interpretation of this interval?
- Out of all the widgets produced in all widget factories, 90% weigh between 7.2 and 8.9 lbs.
  - We can be 90% confident that all widgets weigh between 7.2 and 8.9 lbs.
  - There's a 90% chance the population value is between 7.2 and 8.9 lbs.
  - Ninety percent of all sample means are equivalent to the true mean weight of all the widgets.
  - If you drew many samples of size  $n$  and constructed a confidence interval from each sample, 90% of the intervals would contain the true population value.

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For questions 11-15 refer to the data below:

To estimate the mean height of female high school juniors, you take a random sample of 30 female students and get these results (in inches.) **You want to construct a 97% confidence Interval.**

72	51	67	68	61	69	58	56	60	56
66	61	60	59	59	54	58	53	68	63
57	62	63	64	56	62	58	67	57	70

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11. What's your point estimate of  $\mu$ ?
- 61.17
  - 30
  - 5.4
  - .968
  - 65
12. What's your critical value for the t- score?
- 1.645
  - 2.28
  - 1.96
  - 2.576
  - 2.17
13. What's your  $\bar{x}$  value?
- 61.17
  - 5.37
  - 5.27
  - 2.17
  - .98
14. What's the margin of error?
- 5.432 in
  - .968 in
  - 3.66 in
  - 2.2 in
  - $\sigma/\sqrt{n}$
- 15.. What's this interval?
- (58.93, 63.40)
  - (60.20, 62.14)
  - (65, 69.4)
  - (40,60)
  - (60,65)

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For questions 16 and 17 refer to the following information:

A researcher is interested in estimating the mean blood alcohol content (BAC) of people arrested for driving under the influence. The sample consists of 250 individuals with a mean BAC of .145. Based on past data, the researcher assumes a **population** standard deviation of .065.

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16. What's the margin of error for a 90% confidence interval in this scenario?(Use Z since pop SD is known)
- a) .0041      b) .0068      c) .107      d) .0080  
e) Not enough information to compute the margin of error
17. What's the 95% confidence interval for the scenario above?
- a) (.137, .153)      b) (.080, .210)      c) (.138, .152)      d) (.111, .172)  
e) Not enough information to compute the interval
18. Using a random sample of 4,000 students, you compute a 95% confidence interval to estimate the mean calories consumed by 8<sup>th</sup> graders. You decide to compute another 95% confidence interval using a different sample, this time with only 1,000 students. What change would you expect from the first confidence interval to the second?
- a) The margin of error will be 4 times as wide.  
b) The margin of error will be 2 times as wide.  
c) The margin of error will decrease.  
d) The confidence interval will be smaller  
e)  $\bar{x}$  will decrease
19. A teacher administers a standardized math test to his class of 75 students. The mean score (out of 300 possible points) is 235. From previous studies, you know the population standard deviation is 28. Using the sample data given, calculate a 95% confidence interval for the population mean.
- a) (234.1, 235.9)      b) (226.7, 243.3)      c) (228.7, 241.3)      d) (233.0, 237.0)      e) (200.0, 300.0)
20. The government claims that students earn an average of \$4500 during their summer break from studies. A random sample of students gave a sample average of \$3975, and a 95% confidence interval was found to be  $\$3525 < \mu < \$4425$ . This **confidence level** is interpreted to mean that
- a) If the study were to be repeated many times, there is a 95% probability that the true average summer earnings is not \$4500 as the government claims.  
b) Because our specific confidence interval does not contain the value \$4500 there is a 95% probability that the true average summer earnings is not \$4500.  
c) If we were to repeat our survey many times, then about 95% of all the confidence intervals will contain the value \$4500.  
d) If we repeat our survey many times, then about 95% of our confidence intervals will contain the true value of the average earnings of students.  
e) There is a 95% probability that the true average earnings are between \$3525 and \$4425 for all students.

21. The college newspaper of a large Midwestern university periodically conducts a survey of students on campus to determine the attitude on campus concerning issues of interest. Pictures of the students interviewed along with quotes of their responses are printed in the paper. Students are interviewed by a reporter "roaming" the campus selecting students to interview "haphazardly." On a particular day the reporter interviews five students and asks them if they feel there is adequate student parking on campus. Four of the students say, "no."

Which of the following conditions for inference about a proportion using a confidence interval are violated in this example?

- A The data are an SRS from the population of interest.
- B The population is at least ten times as large as the sample.
- C  $n\hat{p} \geq 10$  and  $n(1 - \hat{p}) \geq 10$ .
- D We are interested in inference about a proportion.
- E More than one condition is violated.

22. You want to design a study to estimate the proportion of students on your campus who agree with the statement "The student government is an effective organization for expressing the needs of students to the administration." You will use a 95% confidence interval and you would like the margin of error to be 0.05 or less. In previous years, it has been noted that the 32% of the campus agree with the statement. The minimum sample size required is approximately

- A 22      B 1795      C 335      D 271      E None of these

23. A marketing company wants to estimate the proportion of consumers in a certain region of the country who would react favorably to a new marketing campaign. Further, the company wants to estimate to have a margin of error of no more than 5 percent with 90 percent confidence. Of the following, which is the closest to the minimum number of consumers needed to obtain the estimate with the desired precision?

- A 136      B 271      C 385      D 542      E 769

24. A professor sampled 46 students from a large university to obtain a 95% confidence interval for the proportion of students in favor of raising ASB fees. The interval was (.356, .397). If the professor had used a 90% confidence interval instead, the confidence interval would have been

- A Wider and would have a smaller chance of missing the true proportion.
- B Narrower and would have a larger chance of missing the true proportion.
- C Narrower and would have a smaller chance of missing the true proportion.
- D Wider and would have a larger chance of missing the true proportion.
- E Wider, but the chance of missing the true proportion cannot be determined.

25. An agricultural researcher plants 25 plots with a new variety of corn. The average yield for these plots is  $\bar{X} = 150$  bushels per acre. Assume that the yield per acre for the new variety of corn follows a normal distribution with unknown mean  $\mu$  and standard deviation  $s = 10$  bushels. A 90% confidence interval for  $\mu$  is

- A)  $150 \pm 2.00$ .    B)  $150 \pm 3.29$ .    C)  $150 \pm 3.42$ .    D)  $150 \pm 16.45$ .    E)  $150 \pm 32$ .

26. A 95% confidence interval for the mean  $\mu$  of a population is computed from a random sample and found to be  $9 \pm 3$ . Which of the following is a correct statement?
- A there is a 95% probability that  $\mu$  is between 6 and 12.
  - B 95% of values sampled are between 6 and 12.
  - C if we took many, many additional random samples and from each computed a 95% confidence interval for  $\mu$ , approximately 95% of these intervals would contain  $\mu$ .
  - D there is a 95% probability that the true mean is 9 and a 95% chance that the true margin of error is 3.
  - E all of the above are true.
27. Other things being equal, the margin of error of a confidence interval increases as
- A) the sample size increases.
  - B) the sample mean increases.
  - C) the population standard deviation increases.
  - D) the confidence level decreases.
  - E) none of the above.
28. Researchers are studying the yield of a crop in two locations. The researchers are going to compute independent 90% confidence intervals for the mean yield  $\mu$  at each location. The probability that *at least one* of the intervals will cover the true mean yield at its location is
- A) 0.19.   B) 0.81.   C) 0.90.   D) 0.95.   E) 0.99.
29. To assess the accuracy of a laboratory scale, a standard weight that is known to weigh 1 gram is repeatedly weighed a total of  $n$  times, and the mean  $\bar{X}$  of the  $n$  weighings is computed. Suppose the scale readings are normally distributed with unknown mean  $\mu$  and standard deviation  $\sigma = 0.01$  grams. How large should  $n$  be so that a 95% confidence interval for  $\mu$  has a margin of error of  $\pm 0.0001$ ?
- A) 100.   B) 196.   C) 385.   D) 10,000.   E) 38,416.

The weight of adult male grizzly bears living in the wild in the continental United States is approximately normally distributed with a mean of 500 pounds and a standard deviation of 50 pounds. The weight of adult female grizzly bears is approximately normally distributed with a mean of 300 pounds and a standard deviation of 40 pounds. Approximately, what would be the weight of a female grizzly bear with the same standardized score ( $z$ -score) as a male grizzly bear with a weight of 530 pounds?

- (A) 276 pounds
- (B) 324 pounds
- (C) 330 pounds
- (D) 340 pounds
- (E) 530 pounds

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**Answers:**

1.A 2.B 3.C 4.False 5.B 6.True 7.D 10.E 11.A 12.B 13.E 14.D 15.A 16.B 17.A 18.B 19.C  
20. D 21. A 22. C 23. C 24. B 25. C 26. C 27. C 28. E 29. 30. B