

AP Statistics

Estimating Population Parameters

Name _____

Date _____

____ 1)

What sample size should we select if we wish to develop a 90% confidence interval for the average diameter of the washers produced by our company, yet we wish to have a margin of error of no more than ± 0.02 mm? Assume our manufacturing process results in a standard deviation of 0.035 mm.

- (A) 3
- (B) 5
- (C) 9
- (D) 17
- (E) 95

____ 2)

The t -distribution critical value for a 90% confidence level and a sample size of 17 is

- (A) 1.341
- (B) 1.734
- (C) 1.740
- (D) 1.746
- (E) 2.583

____ 3)

In a large mall a survey was taken. It was found that in a random sample of 45 women over the age of 25, 15 had children. The 90% confidence interval estimate for the true proportion of women over the age of 25 in the mall who have children is

- (A) (0.0208, 0.0653)
- (B) (0.1374, 0.1626)
- (C) (0.2177, 0.4489)
- (D) (0.3333, 0.5555)
- (E) (0.4337, 0.6774)

4)

A survey was conducted to determine the percentage of college freshmen that planned to take a math course while in college. The results were given as 75% with a margin of error of $\pm 4\%$. What does the margin of error of $\pm 4\%$ mean?

- (A) The percentage of the population that was surveyed was between 71% and 79%.
- (B) 4% of the population was not included in the survey.
- (C) 4% of the students surveyed will most likely change their minds.
- (D) 4% of the students surveyed refused to participate in the poll.
- (E) The difference between the sample proportion and the population proportion is likely to be less than 4%.

5)

A confidence interval will be used to estimate a population proportion. If a random sample of size 50 and a random sample of size 200 are selected, and 90% and 95% confidence intervals for the population proportion are calculated for each sample, which of the four confidence intervals is likely to be the narrowest?

- (A) The 90% confidence interval for the smaller sample
- (B) The 95% confidence interval for the smaller sample
- (C) The 90% confidence interval for the larger sample
- (D) The 95% confidence interval for the larger sample
- (E) The two 95% confidence intervals, they being likely to have roughly equal widths

6)

A random sample of size 8 has been selected from a large population, and the sample mean, \bar{x} , and the sample standard deviation, s , have been calculated. The population standard deviation is unknown. A confidence interval for the population mean is to be constructed. What is the correct formula to use, and what assumption has to be made about the population?

- (A) $\bar{x} \pm z^* \cdot \frac{\sigma}{\sqrt{8}}$; no assumption about the about the population is necessary
- (B) $\bar{x} \pm z^* \cdot \frac{s}{\sqrt{8}}$; we have to assume that the population is normally distributed
- (C) $\bar{x} \pm t^* \cdot \frac{\sigma}{\sqrt{8}}$; no assumption about the about the population is necessary
- (D) $\bar{x} \pm t^* \cdot \frac{s}{\sqrt{8}}$; no assumption about the about the population is necessary
- (E) $\bar{x} \pm t^* \cdot \frac{s}{\sqrt{8}}$; we have to assume that the population is normally distributed

7)

It is estimated that, for the people in a large community, the standard deviation of the daily calorie intake is 245. Assuming that this standard deviation is correct, how large a random sample of people from the community would be necessary in order to estimate the mean daily calorie intake to within 30 calories with 95% confidence?

- (A) 17 (B) 131 (C) 257 (D) 308 (E) 3922

8)

Jimmy, a very promising 8th grader, is taking an AP Statistics class. The teacher has generated on a computer a large set of numbers that are approximately normally distributed and are being considered as the population. Each student is asked to select a random sample from the population and use the sample to construct a 95% confidence interval for the population mean. Jimmy goes ahead and does this. However, when the teacher announces the true population mean to the class, Jimmy notices that the population mean does not lie within his confidence interval. Which of the following is true?

- (A) Jimmy's work could have been correct. Confidence intervals are designed to be narrow, and therefore, for most random samples, the population parameter being estimated will not lie within the interval.
- (B) Jimmy's work could have been correct. For about 5% of students doing this exercise correctly the population mean will not lie within the confidence interval calculated.
- (C) Jimmy's work could have been correct. It will always be the case that the population mean is not within the confidence interval when the population mean doesn't happen to be in the sample selected.
- (D) There must be an error in Jimmy's work. The whole point of confidence intervals is that they should capture the population parameter that is being estimated.
- (E) There must be an error in Jimmy's work. He must have calculated an interval that was too narrow, and it was this that caused the interval not to capture the population mean.

9)

A political party wishes to estimate the proportion of voters that support the party in a particular state. The party will poll a random sample of n voters from the state. Which of the following is likely to result in the smallest margin of error?

- (A) $n = 400$, confidence level = 95%
- (B) $n = 400$, confidence level = 98%
- (C) $n = 400$, confidence level = 99%
- (D) $n = 500$, confidence level = 95%
- (E) $n = 500$, confidence level = 99%

10)

The management of a relatively new social networking website named BooglePlus is conducting a pilot study comparing use of its own site with use of a longer established social networking site named FaceList. Some articles published on the Internet give the reader the opportunity to register votes (called “likes”) for the article on social networking sites to which the reader belongs. A BooglePlus employee selects from the Internet a random sample of 28 articles where the opportunity is given for registering votes for the article on both BooglePlus and FaceList. Letting x be the number of votes on FaceList and y be the number of votes on the BooglePlus, the slope of the least squares regression line of y on x is found to be 0.0623, with a standard error of 0.0224. Which of the following could be used to compute a 95% confidence interval for the slope of the population regression line of y on x ?

- (A) $0.0623 \pm (2.056)(0.0224)$
- (B) $0.0623 \pm (2.052)(0.0224)$
- (C) $0.0623 \pm (2.048)(0.0224)$
- (D) $0.0224 \pm (2.056)(0.0623)$
- (E) $0.0224 \pm (2.052)(0.0623)$

11)

An airline observes a random sample of its flights on a particular route. The 95% confidence interval for the mean time (in minutes) for all flights on this route is calculated to be (47.0, 53.0). Which of the following is NOT true?

- (A) At the 95% confidence level, the true mean flight time is within 3.0 minutes of the sample mean flight time.
- (B) If the true mean flight time were outside the interval (47.0, 53.0) then the sample mean that was found would be very unlikely.
- (C) Approximately $2\frac{1}{2}\%$ of flights on this route are longer than 53 minutes.
- (D) We are 95% confident that the true mean flight time is between 47.0 and 53.0 minutes.
- (E) If many random samples of the same size were taken and the 95% confidence intervals were calculated, then 95% of the confidence intervals would contain the true mean flight time.

12)

A radio talk show host with a large listening audience is interested in the proportion p of adults in his listening area that think that the United States should not be at war in Afghanistan. He asks this question to his listeners “Do you think the United States should be at war in Afghanistan?” He asks his listeners to phone in and vote “yes” if they agree that the United States should be at war in Afghanistan and “no” if they disagree. Of the 100 people who phoned in 85% answered “yes”. Which of the following assumptions for inference about a proportion using a confidence interval are violated?

- (A) The data are a simple random sample from the population of interest.
- (B) The population is at least 10 times as large as the sample.
- (C) The sample size n is so large that both the count of successes $n \cdot p$ and the count of failures $n(1 - p)$ are 10 or more.
- (D) We are interested in inference about a proportion.
- (E) There appear to be no violations.