

## Topics: Confidence Intervals

1. For each of the following statements, indicate whether it is True/False. If false, explain why.

- I. The sample size of the survey should at least be a fixed percentage of the population size in order to produce representative results.

ANS: True (results very much depend on the size(n) of the sample)

- II. The sampling frame is a list of every item that appears in a survey sample, including those that did not respond to questions.

ANS: False (sampling frame is a list of all the items in the target population)

- III. Larger surveys convey a more accurate impression of the population than smaller surveys.

ANS: True (Large sample = less standard deviation)

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2. *PC Magazine* asked all of its readers to participate in a survey of their satisfaction with different brands of electronics. In the 2004 survey, which was included in an issue of the magazine that year, more than 9000 readers rated the products on a scale from 1 to 10. The magazine reported that the average rating assigned by 225 readers to a Kodak compact digital camera was 7.5. For this product, identify the following:

- A. The population

ANS: more than 9000

- B. The parameter of interest

ANS: average rating

- C. The sampling frame

ANS: All readers of *PC Magazine*

- D. The sample size

ANS: 225

- E. The sampling design

ANS: Random

- F. Any potential sources of bias or other problems with the survey or sample

ANS: The area/state/country could be one. The category of the product presented in the Survey. Plus the response rate is not available so we don't know the motivation of the people responded

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3. For each of the following statements, indicate whether it is True/False. If false, explain why.
- I. If the 95% confidence interval for the average purchase of customers at a department store is \$50 to \$110, then \$100 is a plausible value for the population mean at this level of confidence

ANS: True (Confidence interval identifies the collection of values for the population which is consistent with the observed sample)

- II. If the 95% confidence interval for the number of moviegoers who purchase concessions is 30% to 45%, this means that fewer than half of all moviegoers purchase concessions.

ANS: False (Cannot say that with absolute certainty with this information)

- III. The 95% Confidence-Interval for  $\mu$  only applies if the sample data are nearly normally distributed.

ANS: False (Confidence Interval is depended on many factors and not just  $\mu$ )

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4. What are the chances that  $\bar{X} > \mu$  ?

- A.  $\frac{1}{4}$
- B.  $\frac{1}{2}$
- C.  $\frac{3}{4}$
- D. 1

ANS: 0 percent chance  $\mu$  is always bigger than  $\bar{X}$

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5. In January 2005, a company that monitors Internet traffic (WebSideStory) reported that its sampling revealed that the Mozilla Firefox browser launched in 2004 had grabbed a 4.6% share of the market.

- I. If the sample were based on 2,000 users, could Microsoft conclude that Mozilla has a less than 5% share of the market?

ANS: Yes

- II. WebSideStory claims that its sample includes all the daily Internet users. If that's the case, then can Microsoft conclude that Mozilla has a less than 5% share of the market?

ANS: Yes

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6. A book publisher monitors the size of shipments of its textbooks to university bookstores. For a sample of texts used at various schools, the 95% confidence interval for the size of the shipment was  $250 \pm 45$  books. Which, if any, of the following interpretations of this interval are correct?

- A. All shipments are between 205 and 295 books.

ANS: Incorrect (confidence interval is 95%)

- B. 95% of shipments are between 205 and 295 books.

ANS: Incorrect

- C. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.

ANS: Correct

- D. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.

ANS: Incorrect

- E. We can be 95% confident that the range 160 to 340 holds the population mean.

ANS: Incorrect

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7. Which is shorter: a 95%  $z$ -interval or a 95%  $t$ -interval for  $\mu$  if we know that  $\sigma = s$ ?

- A. The  $z$ -interval is shorter
- B. The  $t$ -interval is shorter
- C. Both are equal
- D. We cannot say

ANS : A The  $z$ -interval is shorter Because  $t$ -critical is greater than  $z$ -critical value

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Questions 8 and 9 are based on the following: To prepare a report on the economy, analysts need to estimate the percentage of businesses that plan to hire additional employees in the next 60 days.

8. How many randomly selected employers (minimum number) must we contact in order to guarantee a margin of error of no more than 4% (at 95% confidence)?

- A. 600
- B. 400
- C. 550
- D. 1000

ANS : A 600

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9. Suppose we want the above margin of error to be based on a 98% confidence level. What sample size (minimum) must we now use?

- A. 1000
- B. 757
- C. 848
- D. 543

Ans: C 848

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