

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.

Solution:- False , Because sample size can be anything it may vary in entire population.

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

Solution:- False, because the results depend on the size of the sample. The sample size should have at least 30 observations.

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

Solution:- True

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

Solution:- 9000

B. The parameter of interest

Solution:- Ratings

C. The sampling frame

Solution:- All readers of the issue where the survey was included .

D. The sample size

Solution:- 225

E. The sampling design

Solution:- Individual response.

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

Solution:- Its given only by readers of Pc Magazine and those who are particularly pleased or only who are displeased with the product participated in the survey which makes the result unreliable.

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.

Solution :- True ,Confidence interval identifies the collection of values for the population parameter that are 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.

Solution:- False, In the given data they have mentioned that \$100 is a plausible value for the population mean at 95% level of confidence.

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

Solution:- False . This interval for mean applies for all sample data.

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

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

Solution :- B. $\frac{1}{2}$

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?
Solution:- $P(z < 5)$ is 65.54% thus Microsoft can conclude that Mozilla has less than 5% share of the market.
 - 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? **Solution:-** True
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 ± 45 books. Which, if any, of the following interpretations of this interval are correct?
- A. All shipments are between 205 and 295 books.
 - B. 95% of shipments are between 205 and 295 books.
 - C. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
 - D. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.
 - E. We can be 95% confident that the range 160 to 340 holds the population mean.
 - F. **Solution:-** C. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
7. Which is shorter: a 95% z -interval or a 95% t -interval for μ 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
 - Solution:-** A. The z -interval is shorter

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

Solution:- A.600

n = number of employees

Assume $p=0.5$, $q=0.5$

Margin of error = 0.04

$Z = 1.96$

$$ME = Z * ((p * q) / n)^{0.5}$$

$$0.04 = 1.96 * ((0.5 * 0.5) / n)^{0.5} = \mathbf{600 = n}$$

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

Solution:- C. 848

n = number of employees

Assume $p=0.5$, $q=0.5$

Margin of error = 0.04

$Z = 2.05$

$$ME = Z * ((p * q) / n)^{0.5}$$

$$0.04 = 2.05 * ((0.5 * 0.5) / n)^{0.5} = \mathbf{848 = n}$$