**Topics: Confidence Intervals**

1. For each of the following statements, indicate whether it is True/False. If false, explain why.
2. The sample size of the survey should at least be a fixed percentage of the population size in order to produce representative results.
3. The sampling frame is a list of every item that appears in a survey sample, including those that did not respond to questions.
4. Larger surveys convey a more accurate impression of the population than smaller surveys.

Answer:

1. False. Sample size should be atleast of 30 observations. It doesn’t depend on population size.
2. False. Sampling frame is a list of every item from which sample is collected or we have received suggestions/answers.
3. True.
4. *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:
5. The population
6. The parameter of interest
7. The sampling frame
8. The sample size
9. The sampling design
10. Any potential sources of bias or other problems with the survey or sample

Answer:

1. 9000
2. Rating of the camera – 7.5
3. All readers from the survey who have issue
4. 225
5. Voluntary participation
6. There was voluntary participation, so it is possible that that only those readers who are happy or only those who are not happy may have participated in the survey and thus making the result biased.
7. For each of the following statements, indicate whether it is True/False. If false, explain why.
8. 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.
9. 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.
10. The 95% Confidence-Interval for *μ* only applies if the sample data are nearly normally distributed.

Answer:

1. True – Confidence interval specifies collection of those values frpm population which are consistent for observed sample.
2. False – We cannot make this assumption based on 95% data, we need 100% data to compare this result.
3. False – We should know only the sample size, if sample size is >30 , then as per central limit theorem sample can follow normal distribution regardless of data.
4. What are the chances that ?
5. ¼
6. ½
7. ¾
8. 1

Answer: B

Based on assumption, we can say that there is 50% chance that sample mean can be greater than population mean.

1. 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.
2. If the sample were based on 2,000 users, could Microsoft conclude that Mozilla has a less than 5% share of the market?
3. 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?

Answer:

1. No, we cannot surely conclude that Mozilla has a less than 5% share of the market
2. Yes – We can conclude this based on the statement given in question itself.
3. 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?
4. All shipments are between 205 and 295 books.
5. 95% of shipments are between 205 and 295 books.
6. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
7. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.
8. We can be 95% confident that the range 160 to 340 holds the population mean.

Answer:

1. Incorrect – Data is for 95% interval not for 100%.
2. Incorrect – Interval doesnot describe the shipment values.
3. Correct – Sample size is large, so data will give correct mean.
4. Incorrect – Result of 1 sample cannot be used to analyze another sample.
5. Incorrect - Interval doesnot correspond to 95% confidence level.
6. Which is shorter: a 95% *z*-interval or a 95% *t*-interval for *μ* if we know that σ =s?
7. The z-interval is shorter
8. The t-interval is shorter
9. Both are equal
10. We cannot say

Answer : Z interval is shorter

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.

1. 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)?
2. 600
3. 400
4. 550
5. 1000

Answer: A = 600

Margin of error = 0.04

Z at 95% confidence = stats.norm.ppf(0.975) = 1.96

Assume p^ = 0.5

Margin of error = Z\*(sqrt(p^(1-p^)/n))

0.04 = 1.96\*(sqrt(0.5(1-0.5)/n)

n = (1.96/0.04)^2\*(0.5(1-0.5))

n = 600

1. Suppose we want the above margin of error to be based on a 98% confidence level. What sample size (minimum) must we now use?
2. 1000
3. 757
4. 848
5. 543

Answer: C = 848

All parameters are same, only z changes. Z= 2.33

0.04 = 2.33\*(sqrt(0.5(1-0.5)/n)

n = (1.96/0.04)^2\*(0.5(1-0.5))

n = 848