**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.

**Answer:** False

Reason: A sample size of 30 is considered large enough, but that may or may not be adequate.

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

**Answer:** True

Reason: The population is generic and the sampling frame is a specific list of all items in the population. Hence the sampling frame includes those that did not respond to questions.

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

**Answer:** True

Reason: The larger conveys a more accurate impression of the population as larger surveys involve large sample size which reduces the chances of error.

1. *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:
2. The population

**Answer :**

Readers of the magazine = 9000

1. The parameter of interest

**Answer :**

Rating of the camera (7.5)

1. The sampling frame

**Answer :**

sampling frame: All readers of the issue where the survey was included.

1. The sample size

**Answer :**

225

1. The sampling design

**Answer :**

Voluntary response

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

**Answer :**

It is possible that only those who were particularly pleased or only who are displeased with the product participated in the survey which can makes the results unreliable.

1. For each of the following statements, indicate whether it is True/False. If false, explain why.
2. 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.

**Answer: False**

**Reason:** The 95% confidence interval ($50 to $110) means we are 95% confident that the true population average lies within that range. However, it doesn't guarantee that $100 is the true average. It could be any value within the interval or even outside of it.

1. 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.

**Answer: False**

**Reason:** The 95% confidence interval (30% to 45%) gives the range where we are 95% confident the true proportion of moviegoers who purchase concessions lies. It doesn't directly tell us whether it's fewer than half or not, as the true proportion could be anywhere within that range.

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

**Answer: False**

**Reason:** The 95% confidence interval for μ (population mean) doesn't require the sample data to be nearly normally distributed. It relies on the Central Limit Theorem, which ensures that for a large enough sample size, the sampling distribution of the mean becomes approximately normal, regardless of the shape of the original data.

1. What are the chances that ?
2. ¼
3. ½
4. ¾
5. 1

**Answer: D. 1**

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?

**NO**

**Reason:** Microsoft cannot conclude that Mozilla has a less than 5% share of the market based on the sample of 2,000 users. To make such a conclusion, they would need to conduct a statistical hypothesis test to determine if the observed 4.6% share is significantly less than 5%. The result of the test would depend on factors like the sample size and the variability in the data.

1. 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: YES**

**Reason:** If WebSideStory's sample indeed includes all daily Internet users, which is called a census, then Microsoft can conclude that Mozilla has a less than 5% share of the market, as the observed share of 4.6% is less than 5%. In this case, no statistical hypothesis test is needed because they have data from the entire population, not just a sample, and the observed proportion is already below 5%.

1. 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?
2. All shipments are between 205 and 295 books.

**Answer:** INCORRECT

1. 95% of shipments are between 205 and 295 books.

**Answer:** INCORRECT

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

**Answer:** CORRECT

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

**Answer:** CORRECT

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

**Answer:** INCORRECT

1. Which is shorter: a 95% *z*-interval or a 95% *t*-interval for *μ* if we know that σ =s?
2. The z-interval is shorter
3. The t-interval is shorter
4. Both are equal
5. We cannot say

**Answer: B.**

The t-interval is shorter

The t-interval for the population mean (μ) is typically shorter than the z-interval when the sample size is small and when we use the sample standard deviation (s) as an estimate for the population standard deviation (σ).

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

**Ans: A. 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

n ≈ 848.28

Among the provided answer choices, the closest option is C. So, the answer is C.