**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.

**Ans:**

1. **False.**

The appropriate sample size depends on various factors, including the desired level of precision, the variability within the population, the research objectives, and the available resources. The representativeness is not solely determined by sample size. Other factors, such as sampling methodology, response rates, and minimizing non-response bias, also play a crucial role in achieving representative results.

1. **True.**

The sampling frame refers to a list or set of all individuals or elements that make up the target population from which a sample is drawn. It includes Every item that has a chance of being selected as part of the sample, regardless of whether they respond to the survey questions or not.

1. **True.**

In general, it is true. Larger survey tends to provide a more accurate representation of the population compared to smaller surveys. Larger surveys have a higher chance of capturing the diversity and variability present in the population.

However, the accuracy of a survey also depends on factors such as the sampling method, the quality of data collection, and the representativeness of the sample.

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
3. The parameter of interest
4. The sampling frame
5. The sample size
6. The sampling design
7. Any potential sources of bias or other problems with the survey or sample

**Ans:**

1. All readers of PC Magazine.
2. The average rating assigned by all readers of PC Magazine to the Kodak compact digital camera.
3. The list of all readers of PC Magazine.
4. 225 readers who participated in rating the Kodak compact digital camera.
5. Since the PC Magazine invited all of its readers to participate, this indicates a good sampling approach.
6. Non-response bias: It is not mentioned how many readers were invited to participate, but if only a subset of readers responded, there could be non-response bias if the respondents differ in their opinions from the non-respondents.

Response bias: The survey used self-reported ratings on a scale from 1 to 10. There is potential for response bias, as individual interpretations of the scale could affect the accuracy of the ratings.

Sample representativeness: The survey did not mention any specific sampling method used. If the sample of 225 readers is not randomly selected, the result may not be generalizable.

Timeframe: The survey is specifically mentioned as being conducted in 2004. The relevance of the ratings to current times may be questionable, as consumer opinions and product quality can change over time.

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.
3. 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.
4. The 95% Confidence-Interval for *μ* only applies if the sample data are nearly normally distributed.

**Ans:**

1. **True**
2. **False**

95% confidence interval means if we repeat the sampling process 100 ties, we will capture population mean 95times in our interval. It does not imply anything about the proportion being less than or greater than 50%.

1. **True**
2. What are the chances that ?
3. ¼
4. ½
5. ¾
6. 1

**Ans: B. 1/2**

If the population is normally distributed and the sampling distribution follows the properties of the Central Limit Theorem, then the chances of the sample mean being greater than the population mean are equal to the chances of it being smaller.

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?

**Ans:**

1. If the sample were based on 2000 users, we can construct a 95% confidence interval for the true proportion of users who use Mozilla Firefox.

Given data

sample proportion = 0.046

sample size of 2000

for 95% = 1.96

=

This results in a confidence interval (0.036,0.056). Since the lower bound of this interval is greater than 0.05, Microsoft conclude that Mozilla has a less than 5% share of the market based on this sample.

1. It is highly unlikely to sample to be include data of all daily internet users. Even though if claim of WebSideStory is true and their sample truly includes all daily Internet users, then Microsoft cannot conclude that Mozilla has a less than 5% share of the market based on this sample alone. However, it is still possible for Microsoft to conduct their own study and gather their own sample to try to estimate the true market share of Mozilla with a certain level of confidence.
2. 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?
3. All shipments are between 205 and 295 books.
4. 95% of shipments are between 205 and 295 books.
5. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
6. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.
7. We can be 95% confident that the range 160 to 340 holds the population mean.

**Ans: B.95% of shipments are between 205 and 295 books.**

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

**Ans: A. The z-interval is shorter**

Since the t-distribution has heavier tails than the z-distribution, the t-interval will be wider than the z-interval for the same level of confidence.

××

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**

z = 1.96 for 95% confidence interval

p = 0.5

q = 1 - p = 1-0.5 = 0.5

E = 0.04

n = = = 600.25

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

**Ans: C.848**

z = 2.33 for 98%confidence

n = = = 848.26