**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.

**ANS**: False

1. 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

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

**ANS**: True

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

**ANS**: 9000

1. The parameter of interest

**ANS:** Rating of camera (7.5)

1. The sampling frames

**ANS**: All readers of the issue where the survey was included

1. The sample sizes

**ANS**: 225

1. The sampling designs

**ANS**: voluntary response

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

**ANS**: 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.

**ANS**: In a 95% confidence interval, we can be 95% confident that the true population parameter (in this case, the average purchase of customers) lies within the interval. Since $100 falls within the interval of $50 to $110, it is a plausible value for the population mean at this level of confidence.

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.

**ANS**: The 95% confidence interval indicates that the true population proportion of moviegoers who purchase concessions is estimated to be between 30% and 45% with 95% confidence. This does not necessarily mean that fewer than half of all moviegoers purchase concessions. The interval includes both proportions above and below 0.5 (half), so we cannot definitively conclude that fewer than half buy concessions.

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

**ANS**: The 95% confidence interval for the population mean (μ) doesn't strictly require the sample data to be nearly normally distributed. The central limit theorem often ensures that the sampling distribution of the sample mean is approximately normal, even if the underlying population distribution is not normal. However, certain violations of assumptions (like severe skewness or outliers) might impact the validity of the confidence interval, particularly for smaller sample sizes.

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

**ANS**: B (This is only an assumption, because if we consider more than 50% for sample mean to be greater than the probability of getting a lower value gets overshadowed because sample mean has an equal chance to be lesser 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?

**ANS**: No

As the p Value > alpha for 95% confidence we failed to reject null hypothesis Ho: > 5% null hypothesis

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?

**ANS**: Yes

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.

**ANS**: Incorrect

The interval of 205, 295 is for 95% confidence not for 100%

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

**ANS**: Incorrect

The interval doesn’t describe individual shipments

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

**ANS**: Correct

95% of intervals created in this way contain the true population mean

1. 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

The interval doesn’t describe the mean of another sample

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

**ANS**: Incorrect

The intervals doesn’t correspond 95% confidence level

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**: option A is correct.

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

let’s assume p a as 0.5 and margin of error is given 0.04

n = (z)^2 \* p(1-p)/(E)^(2)

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

= 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

**ANS**: C

Let’s assume p hat and q hat as 0.5 and margin of error is given 0.04

n = (z)^2 \* p hat \* q hat / ME ^2 n = (2.32) ^2 \* (0.5) (0.5) / (0.04) ^2 = 841 samples size