**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.

False. The sample size of the survey should at least to be a fixed percentage of the population size in order to produce representative results. The sample size should be large enough to provide sufficient statistical power and to allow for accurate estimation of the population parameters, but there is no specific percentage of the population size that is required.

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

False. The sampling frame is a list of every item in the population that is eligible to be included in the sample. It does not include items that did not respond to the survey questions.

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

True. Larger surveys generally convey a more accurate impression of the population because they have a larger sample size and are therefore less subject to sampling error. However, it is important to note that the accuracy of a survey also depends on other factors such as the sampling method used and the quality of the questionnaire

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

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A. The population is all PC Magazine readers.

B. The parameter of interest is the average satisfaction rating of all PC Magazine readers with the Kodak compact digital camera.

C. The sampling frame is the list of all PC Magazine readers who were eligible to participate in the survey.

D. The sample size is 225, which is the number of PC Magazine readers who rated the Kodak compact digital camera.

E. The sampling design is not specified. It is possible that the sample was selected using a random sampling method, but without more information it is not possible to determine the specific sampling design used.

F. Potential sources of bias or other problems with the survey or sample include the following:

* Non-response bias: It is possible that some readers who received the survey did not respond, which could introduce bias if the non-respondents differ from the respondents in terms of their satisfaction with the Kodak compact digital camera.
* Self-selection bias: It is possible that only readers who had particularly strong opinions about the Kodak compact digital camera chose to participate in the survey, which could introduce bias if these readers do not represent the views of all PC Magazine readers.
* Limited sample size: The sample size of 225 is relatively small and may not be representative of the entire population of PC Magazine readers. This could lead to sampling error and reduce the accuracy of the results.
* Lack of diversity in the sample: It is not clear if the sample is diverse in terms of demographics, location, and other factors that could affect satisfaction with the Kodak compact digital camera. A more diverse sample would be more representative of the population and could provide more accurate results.

Top of Form

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.

I . True. 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. A confidence interval gives a range of values that is likely to include the true population mean, based on the sample data. If the 95% confidence interval is $50 to $110, this means that there is a 95% probability that the true population mean falls within this range. Therefore, $100, which is within the confidence interval, is a plausible value for the population mean at this level of confidence.

II. False. If the 95% confidence interval for the number of moviegoers who purchase concessions is 30% to 45%, this means that there is a 95% probability that the true percentage of moviegoers who purchase concessions falls within this range. It does not necessarily mean that fewer than half of all moviegoers purchase concessions. In fact, the confidence interval could include values above 50%, which would mean that more than half of all moviegoers purchase concessions.

III. False. The 95% confidence interval for the population mean (μ) can be calculated using any sample data, regardless of whether the data are normally distributed or not. The confidence interval is based on the assumption that the sample is representative of the population and that the sample mean is a good estimate of the population mean. It does not depend on the distribution of the data. However, it is generally easier to calculate the confidence interval when the data are normally distributed because the distribution of the sample mean is known when the sample size is large.

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

ANS: Not enough information to answer this question

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) here,

=0.046, n=2000, = 1.96, q= 0.954

95% confidence interval for the proportion of web users using Mozilla is

± Z = ± 1.96 =0.046±0.00918 = 0.0368- 0.0551.

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?

No, even if WebSideStory's sample includes all daily Internet users, Microsoft cannot conclude that Mozilla has a less than 5% share of the market based on this information alone. A sample that includes all daily Internet users may still be subject to sampling error and other sources of bias, which could affect the accuracy of the estimate of the market share of Mozilla Firefox. In order to make a conclusion about the market share of Mozilla Firefox, Microsoft would need to consider additional factors such as the sampling method used and the level of confidence desired.

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.
3. 95% of shipments are between 205 and 295 books.
4. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
5. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.
6. We can be 95% confident that the range 160 to 340 holds the population mean.

Option A: All shipments are between 205 and 295 books is incorrect because the confidence interval only gives a range of values that is likely to include the true population mean, not all values in the population.

Option B: 95% of shipments are between 205 and 295 books is incorrect because the confidence interval only gives a range of values that is likely to include the true population mean, not all values in the sample.

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

The 95% confidence interval for the size of the shipment is 250 ± 45 books, which means that the range of values from 205 to 295 books is likely to include the true population mean, based on the sample data. This interpretation is correct because the confidence interval gives a range of values that is likely to include the true population mean, based on the sample data, with a probability of 95%.

Option D: If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295 is incorrect because the confidence interval only applies to the current sample, not to future samples.

Option E: We can be 95% confident that the range 160 to 340 holds the population mean is incorrect because the confidence interval is 250 ± 45 books, not 160 to 340. The confidence interval gives a range of values that is likely to include the true population mean, based on the sample data, with a probability of 95%

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.

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
6. Suppose we want the above margin of error to be based on a 98% confidence level. What sample size (minimum) must we now use?
7. 1000
8. 757
9. **848**
10. 543