Topics: Confidence Intervals

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

   I. 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
   The result depends on the size of the sample. Thus the sample size should have at least 30 observationns.

   II. 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
   A sampling frame is a list of all the items in your population which units are drawn for the sample. The difference between a population and a sampling frame is that the population is general and the frame is specific.

   III. Larger surveys convey a more accurate impression of the population than smaller surveys.
   Ans. True

2. *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:

   A. The population
   Ans: Readers of magazine which is 9000
   B. The parameter of interest
   Ans: Rating of camera 7.5
   Sample size, average, scale
   C. The sampling frame
   Ans : Sampling frame is all readers of the issue where survey is included.
   D. The sample size
   Ans : Sample size is 225
   E. The sampling design
   Ans Voluntary response-probability for any given sample being drawn(self chosen participants)
   F. Any potential sources of bias or other problems with the survey or sample
   Ans: It is possible only for particularly please or only displeased with product participated in survey which can make the result reliable.

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

    I. 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 : True
    Confidence interval identifies the collection of calues for the population parameter that are consistent with the observed sample

    II. 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: False
    The confidence will tell you the probability of the population falling within the range, but it does not tell you the distribution. We have to consider the value out of the range more than 95%

    III. The 95% Confidence-Interval for μ only applies if the sample data are nearly normally distributed.
    Ans: False
    The central limit theorem implies that sampling distribution is normal regardless of the data.
    We should have at least larger than 30

4. What are the chances that $\overline{X} > \mu$?

    A. ¼
    B. ½
    C. ¾
    D. 1
    Ans: B -1/2
    There is 50% chance of sample mean(x) is greater than the population mean(mu)

5. 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.

    I. If the sample were based on 2,000 users, could Microsoft conclude that Mozilla has a less than 5% share of the market?
    Ans: x=0.046, n=2000, z(95%)=1.96, q=0.594
    95% confidence interval for the proportion of web users using mozila is 0.0368 to 0.0551

II. 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: Thus the data on the whole population and the sample value accurately reflects the population number. We can conclude that the share is less than 5%.

6. 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?

   A. All shipments are between 205 and 295 books.
   Ans: Incorrect-the interval 205 and 295 is 95%.

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

   C. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
   Ans: Correct-95% of intervals contains true population mean

   D. 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 does not describe the mean of another sample.

   E. We can be 95% confident that the range 160 to 340 holds the population mean.
   Ans : Incorrect- The interval does not correspond to a 95% confidence level.

7. Which is shorter: a 95% *z*-interval or a 95% *t*-interval for μ if we know that σ =s?

   A. The z-interval is shorter
   B. The t-interval is shorter
   C. Both are equal
   D. We cannot say

Ans :A-the z-interval is shorter-95 % confidence interval for mean is shorter for z-interval because t-critical is greater than z-critical value.

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.

8. 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)?

    A. 600
    B. 400
    C. 550
    D. 1000

Margins of error estimate is 1/sqrt(n)
n=25^2
if 0.04=1/25 is margin of error
Ans: 600

9. Suppose we want the above margin of error to be based on a 98% confidence level. What sample size (minimum) must we now use?

    A. 1000
    B. 757
    C. 848
    D. 543

Confidence level 1-alpha=0.98
z-score=2.33
Ans: c-848