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:- True

   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

   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
   B. The parameter of interest
   C. The sampling frame
   D. The sample size
   E. The sampling design
   F. Any potential sources of bias or other problems with the survey or sample

ANS:-A) 9000
        B) 7.5
        C)9000
        D)225
        E) 1to10
        F) It is possible that only those who were particularly please or who are
unpleased with the product participated in survey which can make the result unreliable.

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.

    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.

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

ANS:- I)TRUE

    II)False, we have direction but we can not 100% baised on data.

    III)False, there is no need of sample data should be normally distributes, but the sample size must be greater than 30.

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

    A. ¼
    B. ½
    C. ¾
    D. 1

ANS;- It has 50%50% chances that mean of sample can be greater than mean of population.

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?

    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:-I) h0=mozilla has more than 5% share of the mark=et; h0>5%
    Ha=Mozilla has less than 5% share of the market ; ha<5%

  Apply one sample one tail Z-test:-

        z-score=(0.045-0.05)/np.sqrt((0.05*(1-0.05))/2000)
        z-score = - 0.82078

from z table we get the value of 1.96
so we will go with the null hypothesis
so we conclude that Mozilla has more than 5% share of the market.

II) WebSideStory claims that its sample includes all the daily Internet users.
   That means 4.6% share of the market shows fort entire population.
   So Microsoft conclude that mozilla has less than 5% share of the market.

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

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

         ANS:- Incorrect

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

         ANS:- Correct

      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

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

    ANS:-Incorrect

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

    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

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

ANS:- z-value of 95% confidence is 1.96
     Stats.norm.ppf(0.975)
    Margin of error = 0.04
    ME = z*sqrt((p*q)/n)

    We have to find the n
    Hence,
    N= p*q/ME^2*z
    Assume p=0.5 and q= 0.5

  Then n= (05*0.5)/ (0.04*0.04) *1.96^2= (0.25/0.0016) *3.8416
     =600.25
   Option A is correct which is 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

ANS:- z- value of 98% confidence is 2.326

N = (0.25/0.0016)*5.41= 1.352/0.0016=845.35
  Option c is correct which is 848