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, because sample size must have min 30 observations

    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, because sample frame is a list of target population from which sample is chosen.

    III. Larger surveys convey a more accurate impression of the population than smaller surveys.
    ANS:- True, because large surveys have less standard deviation.

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. P=x/n = 225/9000=0.025
    B. Ratings of the camera(7.5)
    C.all the readers of the issue where survey was conducted
    D.225
    E.Voluntary response from the readers
    F.Yes it could be,because its likely the people who were happy or unhappy with their product those only participated in this survey.

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 ,because it helps to collect the values population which are consonant with 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:- True, because 95% of the people who purchase concessions is b/w 30% to 45% which is less than 50%.

III. The 95% Confidence-Interval for μ only applies if the sample data are nearly normally distributed.
ANS:- False, we should have large sample(atleast more than 30)

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

A. ¼
B. ½
C. ¾
D. 1

ANS:- D is correct option, as it has 100%chances that population sample is >population Mean.

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 Z95 =1.96 Q=0.954
95% confidence interval for proportion of web users using Mozilla
X ±Z√xq/n=2000,Z95 = 1.96 q√0.046*0.954/2000 = 0.046 ±0.00918
=0.0368-0.0551.

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:- We have the data of population & sample value which shows population number.

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 of(205,295) is of 95%

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. is correct option

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:- N=no of employee, 95% CI , Z value – 1.96
$ME = Z^*\sqrt{pq/n}$
$0.04 = 1.96^*\sqrt{0.5^*0.5/n}$
$N = 1.96^2*0.5*0.5/0.04 = 0.9604/0.0016 = 600$

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=2.576

$0.04=2.326 \sqrt{0.5*0.5/n}$

$N=2.326*0.5*0.5/0.04^2 = 1.3525/0.0016 = 845.3$

So the nearest value is 848, C option.