**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 : Above statement is FALSE**

**The results depend on the size (n) of the sample. The sample size should have at least 30 observations.**

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 : Above statement is FALSE**

**The sampling frame is list of all the items in the largest population from which the sample is selected.**

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

**ANS : Above statement is TRUE**

**Large sample size will result in less standard deviation compared to the small sample size and hence we can say that larger sample is more accurate.**

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 : More than 9000**

1. The parameter of interest

**ANS :**

* **Sample size**
* **Average**
* **Scale**

1. The sampling frame

**ANS : Ratings of camera**

1. The sample size

**ANS : 225**

1. The sampling design

**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 happy or only who are unhappy 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 : Above statement is TRUE**

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 : Above statement is FALSE**

**We have statement in the question in that direction is given but we cannot confirm 100% based on this data so we have to consider the values out of this range (i.e. More than 95% confidence interval).**

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

**ANS : Above statement is FALSE**

**We should have a moderately large sample (usually at least larger than 30**

**for many cases), the central limit theorem implies that the sampling distribution is normal regardless of the data itself.**

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

**ANS : There are 50% chances of sample mean is greater 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 :**

**Let us assume,**

**Null hypothesis, H0:P≥5% ……..(Browser has 5% or more than it share in market)**

**Alternate hypothesis Ha:<5% ….(Browser has less than 5% share in the market)**

**By calculations we observed that, the value of z statistics is -0.8210**

**And 5%(0.05)level of significance Z-table gives a critical value is -1.96**

**If we compare both values, we observed that, the value of our test statistics is more as compare to the actual Z-critical value. & Hence, we can’t reject H0**

**So we can say, Mozilla has more than or equal to 5% share of the market.**

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 : In this case, we have data on the entire population and the sample value accurately reflects the population number. Thus, we can conclude that the share is less than 5%.**

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 : Above statement is Incorrect.**

* **The interval of (205, 295) is for the 95% confidence interval not for 100%**

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

**ANS : Above statement is Incorrect.**

* **The given interval doesn’t describe individual shipment.**

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

**ANS : Above statement is Correct.**

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 : Above statement is 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 : Above statement is Incorrect.**

**The interval doesn’t correspond to a 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 : If we consider,**

**n = 50 , sample mean = 100 , S.D = 100 & confidence interval = 95%**

**we got Z-value = 1.96**

**t – value = 2.01**

**t – value > Z-value**

**and hence we can say that 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

**ANS : Given data ,**

**Margin of error (ME) = 4% = 0.04**

**Confidence interval = 95%**

**Z – value for 95% confidence interval is = 1.96**

**ME = Z \***

**(p \* q) / n**

**Here, p is predicted value & q is the value that we have to predict.**

**Let us assume the value of p & q as 0.5**

**0.04 = 1.96 \* √ (0.5\*0.5)/n**

**n = 24.5 \*24.5 = 600.25**

**≈ 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 :**

**Given data ,**

**Margin of error (ME) = 4% = 0.04**

**Confidence interval = 98%**

**Z – value for 98% confidence interval is = 2.326**

**ME = Z \***

**(p \* q) / n**

**Here, p is predicted value & q is the value that we have to predict.**

**Let us assume the value of p & q as 0.5**

**0.04 = 2.326 \* √ (0.5\*0.5)/n**

**n = 29.075 \* 29.075 = 845.355**

**≈ 848**