**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: - True: The representation of the survey results should have a sample size. The sample size must be a fixed percentage of the total population size of the survey.

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:- False: The sampling frame refers to a list of items which responds to the question and not the ones which do not respond to the questions.

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

Ans: - True: The larger conveys a more accurate impression of the population as larger surveys involve large sample size which reduces the chances of error.

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

Sol: - p=x/n=225/9000=0.025

1. The parameter of interest

Sol: - sample size, average, scale.

1. The sampling frame.

Sol: - 9000

1. The sample size.

Sol: - 225

1. The sampling design.

Sol: -

Inferential statistics

Steps==Population--🡪Sample Frame--🡪Simple Random sample-🡪Sample.

1. Any potential sources of bias or other problems with the survey or sample
2. For each of the following statements, indicate whether it is True/False. If false, explain why.
3. 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

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: - True

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

Ans: - False: With a large enough sample, the central limit theorem implies a normal sampling distribution regardless of the distribution of the data.

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

## Sol: - P (Problem will be solved)

=1−P (Problem will not be solved by A, B,C and D)

=1− [(1−1/4​) (1−1/2​) (1−3/4​) (1- 1)]

=1−(0.75x0.5x0.25x0) =1−0​=1

Hence, D is the correct option.

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?

Sol: - Let **p** = population proportion share of the market by Mozilla

So, **Null Hypothesis**,  : p  5% {means that Mozilla has more than or equal to 5% share of the market}



**Alternate Hypothesis**,  : p < 5% {means that Mozilla has a less than 5% share of the market}



The test statistics that will be used here is **One-sample z-test for** **proportions**.

                           T.S.  =     ~ N(0,1)



where,  = sample proportion of the share of the market grabbed by Mozilla in 2004 = 4.6%



           n = sample of users = 2,000

**So, the test statistics** =



                                    = -0.821

The value of z-test statistics is -0.821.

Since in the question we are not given with the level of significance, so we assume it to be 5%. **Now, at 5% level of significance the z table gives a critical value of -1.96 for left-tailed test.**

Since the value of our test statistics is more than the critical value of z, so we have insufficient evidence to reject our null hypothesi*s* as it will not fall in the rejection region.

**Therefore, we conclude that 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: - **Hence, we can conclude that Mozilla has a less than 5% share of the market.**

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.

Sol: - **Given:** the 95% confidence interval for the size of the shipment

were 250+45,250-45 books. =295,205

The % confidence interval for the size of shipment was books.



All shipments are not between  and  books. Because due to % confidence interval for the size of shipment not all shipments.



Option A correct.

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.

Sol: - Because it tells us the difference between the means of distribution and data points in standard deviation.

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

Sol: - In a sample with a number n of people surveyed with a probability of a success of , and a confidence level of , we have the following **confidence interval of proportions.**



**In which**

z is the z score that has a p value of .



**The margin of error is:**



**98% confidence level**

So , z is the value of Z that has a p value of , so .



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: - How many randomly selected employers must we contact to create an estimate in which we are 98% confident with a margin of error of 5%**

We don’t know the proportion, so we use , which is when we are going to need the largest sample size.



We have to find n when M = 0.05. So



n = 542.49

Rounding up

We need to contact 543 employees.