**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.

This statement is False.

Representative results depend on the sample (n) size rather than a percentage of the population size. A sample of n>=30 is considered a sufficiently large amount.

1. The sampling frame is a list of every item that appears in a survey sample, including those that did not respond to questions.

This statement is True.

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

This statement is True.

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

Users of different brand of electronics.

1. The parameter of interest

Population size, sample size, average and rating.

1. The sampling frame

The 9000 readers that rated the product.

1. The sample size

225 readers.

1. The sampling design

Voluntary rating.

1. Any potential sources of bias or other problems with the survey or sample

The key to random selection is that there is no bias involved in the selection of the sample, but surveys conducted by the magazines often suffer from nonresponse bias and also the source of this data is from readers that read PC magazine vs the whole population that do not read PC magazine, yet they use these different brands of electronics.

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.

This 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.

This statement is False.

The above information implies only for 30 to 45% of moviegoers at 95 % confidence further than this we do not have any knowledge. Therefore, we cannot be 100% sure for the above statement.

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

This statement is False.

The 95% confidence Interval for population mean can be applied to distribution that aren’t normal, but they are easy to understand in symmetric distributions. For other distributions we can use the central limit theorem to make a normal approximation.

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

(This is only an assumption, because if we consider more than 50% for sample mean to be greater than the probability of getting a lower value gets overshadowed because sample mean has an equal chance to be lesser 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?

No.  
As the p Value > alpha for 95% confidence we failed to reject null hypothesis Ho: > 5% null hypothesis.

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?

Yes.

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.

This statement is Incorrect.

95% of the time the size of the shipment will be around 250 +/- 45 books.

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

This statement is Correct.

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

This 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.

This statement is Correct.

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

This statement is incorrect. As we increase the range, the % of confidence increases for a normal distribution it will be 97.5% that the mean will lie between 160 to 340.

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

A: For 95% confident Z-interval is shorter (1.960), as for t-interval (1.962) it increases as degree of freedom decreases.

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

B Margin of Error = Z \* under root (ˆp \* ˆq/ n) n = sample size.

Z is score depends on the confidence level, ˆp is the predictable value and ˆq is the value to be predicted value.

let’s assume ˆp and ˆq as 0.5 and margin of error is given 0.04

n = (z)^2 \* ˆp \* ˆq / ME^2 n = (1.65) ^2 \* (0.5) (0.5) / (0.04) ^2 n = 425 sample size

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

Let’s assume p hat and q hat as 0.5 and margin of error is given 0.04

n = (z)^2 \* p hat \* q hat / ME ^2 n = (2.32) ^2 \* (0.5) (0.5) / (0.04) ^2 = 841 samples size.