**B 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.

**Answer: -** **False**, for appropriate sample size depends on various factors, like desired

accuracy, population variability, level of confidence. Generally larger sample size leads to more accurate results.

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

**Answer: - False,** The sampling frame is not a list of every item that appears in a survey sample, including those that did not respond to question, instead it is a list of all individual or item from the population from which sample is selected.

Sample should be accurate that represent complete and accurate to ensure that sample is representative of population but it does not include who not responded or excluded from the list.

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

**Answer: - True,** larger survey convey a more accurate impression of the population than smaller survey because large sample size gives more accurate result compare to smaller sample size.

Large sample size reduces sampling error, which diff between sampling statistics and true population parameter.

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

**Answer: -** In this case the population is all the readers of PC Magazine who are interested in electronics products specially who are interested in Kodak compact digital camera.

1. The parameter of interest

**Answer: -** The parameters of interest is average rating assigned to the kodak compact digital camera by all readers of PC magazine who are interested in electronics products.

1. The sampling frame

**Answer: -** The sampling frame is all readers who are interested in electronics products, specially kodak compact digital camera

1. The sample size

**Answer: -** The sampling size of particular kodak compact digital camera is 225.

1. The sampling design

**Answer: -** The sampling design used in the survey is unknown since it was not clearly mentioned. It is possible that simple random variable is used where every reader had an equal chance being selected. Here we can’t say without much information about this.

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

**Answer: - S**ome potential sources of bias or other problems with the survey or sample include self- selection bias.

Where readers who are strongly dissatisfied or satisfied with the products may be more likely to respond compare to those who are neutral, and also the sampling is not representative of entire population of readers who are interested in electronics products.

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.

**Answer: -** True, This is because the confidence interval indicates that there is a 95% probability that the true population mean falls between $50 and $110, and $100 is within this range.

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.

**Answer: -** False, 95% confidence interval for the number of moviegoers who purchase concessions is 30% to 45%, this means 95% probability that true proportion of moviegoers who purchase concession falls between 30% to 45%, it does not necessary that fewer than half of all moviegoers purchase concessions, may be actual data is more than 45%

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

**Answer: -** False, the 95% Confidence-Interval for *μ* only applies if the sample data are nearly normally distributed, if data is not normally distributed, then other method is not used to construct a confidence interval, (Confidence interval depends on many factors not only just *μ)*

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

**Answer: - B**

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?

**Answer: - No,** Microsoft cannot conclude that Mozilla has a less than 5% share of the market based on 2000 users because sample size alone cannot determine the accuracy of the estimate.The margin of error also must also be considered.

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?

**Answer: - 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.

**Answer: -** The interpretations in **Incorrect,** the confidence interval tells the chances of all shipments falls between 205 to 295, based on sample data, but it doesn’t mean that all individual shipment falls under this range.

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

**Answer: -** The interpretations is **Correct,** the confidence interval means that we take many samples and then we calculate 95% confidence interval for each sample, it does not mean 95% confident that any single shipment falls between 205 to 295. And also size of shipment could be anywhere within or outside the interval.

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

**Answer: -** The interpretations in **Correct,** The procedure that produced the 95% confidence interval generates ranges that would contain the population mean for 95% of samples taken from the same population.

1. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.

**Answer: -** The interpretations in **Incorrect,** the confidence interval provides the information about the first sample, it doesn’t mean that second sample also falls between 205 to 295 intervals.

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

**Answer: -** The interpretations in **Incorrect,** Because confidence interval for the specific size and data collected we cannot specify it the other ranges also.

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

**Answer: - 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.

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

**Answer: - A.** 600

n = (Z^2 \* p \* q) / E^2

p= 0.5

margin error 4% = 0.04

confidence interval = 95% (z=1.96)

n = (1.96^2 \* 0.5 \* 0.5) / 0.04^2

n = 3.8416 \* 0.25 / 0.0016

n ≈ 0.9604 / 0.0016

n ≈ 600.25

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

**Answer: -C.** 848

n = (Z^2 \* p \* q) / E^2

p= 0.5

margin error 4% = 0.04

confidence interval = 98% (z=2.33)

n = (2.33^2 \* 0.5 \* 0.5) / 0.04^2

n = 5.4289 \* 0.25 / 0.0016

n ≈ 1.357225 / 0.0016

n ≈ 848.26