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.

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

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

Ans:

I. **TRUE:**

II. **FALSE:**

The sampling frame refers to a list of an item which responds to the question and not the ones which do not respond to the questions

III. TRUE:

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:

Given data:

X = 225

N = 9000

A) 9000

B) Population size, average, rating scale (Rating of the camera = 7.5)

C) All readers of the issue where the survey was included (around 9000)

D) 225

E) Voluntary response

F) It is possible that only those who were particularly pleased or only who are displeased with The product participated in the survey which can makes the results unreliable

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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.

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.

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

Ans:

I . TRUE

Confidence intervals identify that what is the collection of values for the population Parameter that are consistent with the observation sample

II . FALSE

We have information in the direction, but we can't say 100percentage on this data We have to consider the value s out of the range is more than 95% CI

III. FALSE

With a large enough sample, the central limit theorem implies a normal sampling Distribution regardless of the distribution of the data

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

A. ¼
B. ½
C. ¾
D. 1

Ans : B

When your sampling distribution follows normal distribution , the probability of getting a sample mean greater than mu is 50% .

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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?

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:

I. Let,

P = population proportion share of the market by Mozilla

N = 2000
X bar = 0.046
5% Z score value = -1.96

Null hypothesis H : p > are equal to 5% (that means Mozilla has more than equal to 5% share of the market)

Alternative hypothesis H1 : P< 5% (that means Mozilla has less than 5% share of the market)

Apply one – sample one – tail Z-test :

Z_ test = (0.046 – 0.05) / (np.sqrt((0.05 * (1 – 0.05)) / 2000)) = - 0.8207

Z statistical value is greater than Z critical value (-0.8207 > -1.96) also we get P value = 0. 2058
Therefore, we accept null hypothesis i.e., Mozilla has more than or equal 5% share of market

II. WebSideStory claims that its sample includes all the daily internet users. This means that the 4.6% share of the marker represents the whole population

So, we can conclude that Mozilla has a less than 5% share of the market.

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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.

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

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

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

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

Ans:

A) Incorrect
because the intervals are (205, 295) for 95% confidence not for 100% confidence

B) **Correct**

C) Correct

D) **Incorrect**
these intervals don't describe the mean of another sample

E) Incorrect

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7) Which is shorter: a 95% *z*-interval or a 95% *t*-interval for μ if we know that σ =s?

   A. The z-interval is shorter
   B. The t-interval is shorter
   C. Both are equal
   D. We cannot say

Ans: **A**

for 95% confident 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.

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: **A**

Margin of Error = Z * sqrt (p^ * q^/n)

Here we have ME = 0.04, p^ = 0.5, q^ = 0.5 we know Z critical vale for 95% confidence= 1.96

So, 0.04 = 1 .96 *sqrt (0.5 * 0.5/n)

N = 1.96 ^2 * 0.25 / 0.04^2

= 600

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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: **C**

0.04 = 2.326 * sqrt (0.5 * 0.5/n)

N = 2.326^2 * 0.25 / 0.04^2

= 845.35