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.

Answer: False

A sample size is considered large enough, but that may or may not be adequate.

II. 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

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

Answer: True

Because accuracy of larger survey is higher compare to the smaller survey.

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
   Answer: Greater than 9000
B. The parameter of interest
   Answer: Average Ratings
C. The sampling frames
   Answer: All readers are PC Magazine
D. The sample sizes
   Answer: 225
E. The sampling designs
   Answer: Random Variables
F. Any potential sources of bias or other problems with the survey or sample
   Answer:

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.

Answer: True
95% confidence interval is range of value and contain true mean of population, with large sample mean much precision.

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.

Answer: False
Because it is beneficial to moviegoers to purchase movie tickets.

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

Answer: True

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

A. ¼
B. ½
C. ¾
D. 1

Answer: B
This is only assumption. There is a 50% chance that the sample mean is greater than population mean.

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?
Answer: yes

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?
Answer: yes

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.
Answer: incorrect
B. 95% of shipments are between 205 and 295 books.
Answer: incorrect
C. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
Answer: correct
D. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.
Answer: incorrect
E. We can be 95% confident that the range 160 to 340 holds the population mean.
Answer: incorrect

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

Answer: A
Because it tells us difference between mean of the distribution and data points in standard deviation. The Z-value for 95% confidence interval = 1.96 and the t-value for 95% confidence interval = 2.262.

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

Answer: A

Margin of Error = $z\times \sqrt{\frac{p\times q}{n}}$

Here margin of error = 0.04
p and q assume 0.5
for 95% confidence interval, the critical value z=1.96
n = number of employers

now put these values in equation,

$0.04 = 1.96 \times \sqrt{\frac{0.05\times 0.05}{n}}$

$\frac{0.04}{1.96} = \sqrt{\frac{0.05\times 0.05}{n}}$ (Squaring both sides)

$0.000416 = \frac{0.25}{n}$

n = 600.961

so, we take n ≈ 600

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

Answer: C

Margin of Error = $z\times \sqrt{\frac{p\times q}{n}}$

Here margin of error = 0.04
p and q assume 0.5
for 95% confidence interval, the critical value z=2.326
n = number of employers

now put these values in equation,

$0.04 = 2.326 \times \sqrt{\frac{0.05 \times 0.05}{n}}$

$\frac{0.04}{2.326} = \sqrt{\frac{0.05 \times 0.05}{n}}$ (Squaring both sides)

$0 = \frac{0.25}{n}$

n = 854.9

so, we take n ≈ 600