Topics: Confidence Interval

1. **For each of the following statements, indicate whether it is True/False. If false, explainwhy.**

    I. **The sample size of the survey should at least be a fixed percentage of thepopulation size in order to produce representative results.**

Answer : True

    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

The sampling frame contain only response values. The no response values only increases size of the sample and makes no sence to the analyst.

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

Answer : 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 themagazine 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:***

Answer :

A. **The population** = 9000

B. **The parameter of interest** = 7.5 (*on a scale from 1 to 10)*

C. **The sampling frame** = All the readers of the magazine

D. **The sample size** = 225

E. **The sampling design** = Voluntary voting

F. **Any potential sources of bias or other problems with the survey or sample =**

People only who are extremely happy or people who are extremely unhappymight be included in the sample which makes the output un-reasonable.

3. For each of the following statements, indicate whether it is True/False. If false, explainwhy.

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 populationmean at this level of confidence.**

Answer : True

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 moviegoerspurchase concessions.**

Answer : False. Because we cannot get into such conclusion with the provided data.

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

Answer : False. It can be applied for any kind of confidence interval.

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

A. ¼
B. ½
C. ¾
D. **1**

Answer : Option D) 1 , is correct answer.

5. In January 2005, a company that monitors Internet traffic (WebSideStory) reported that itssampling 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 Mozillahas a less than 5% share of the market?**

Answer :

```
import numpy as np
from scipy import stats
# Apply One-Sample One-Tail z-test
z_scores=(0.046-0.05)/(np.sqrt((0.05*(1-0.05))/2000))
print('z-scores : ' ,z_scores)

p_value=1-stats.norm.cdf(abs(z_scores))
print('p-value : ' ,p_value)
```

Output : z-scores : -0.820782681668124
p-value : 0.20588503245107104
Hence , do not reject null hypothesis, since 0.205 > 0.05

Microsoft can not conclude that Mozilla has a less than 5% share of the market.

I. 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 themarket?

Answer :

We are given that WebSideStory claims that its sample includes all the daily Internet users.

This means that the 4.6% is the population percentage. Comparing it with Microsoft's claim that Mozilla has a less than 5% share of the whole market is True.

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

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?

Answer :

A. All shipments are between 205 and 295 books.

→ No, because interval is only 95% confidence.

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

→ Yes

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

→ Correct, 95% of the intervals calculated in this way contain the population mean.

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

→ No, because the interval is not for the mean of another sample.

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

→ No, because the interval is not correspond to 95% confidence interval.

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 : 95% z-interval is shorter because the cririca l value of t is greater than the critical value of z.

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 thenext 60 days.

8. How many randomly selected employers (minimum number) must we contact in order toguarantee a margin of error of no more than 4% (at 95% confidence)?

A. 600
B. 400
C. 550
D. 1000

Answer :

Consider , $p \approx 0.5$
At 95% confidence interval
,z-score = 1.960

$N = ((1.960/0.4)^2 * 0.5 * (1-0.5))*100$
$N = 600.25$
$N \approx 600$

Hence , option A is correct option.

9. Suppose we want the above margin of error to be based on a 98% confidence level. Whatsample size (minimum) must we now use?

A. 1000
B. 757
C. 848
D. 543

Answer : Consider , $p \approx 0.5$

Z-score for 98% interval = 2.326

$N = ((2.326/0.4)^2 * 0.5 * (1-0.5)) * 100$
$N = 848.36$
$N \approx 848$

Hence , option C is correct option.