**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.
3. The sampling frame is a list of every item that appears in a survey sample, including those that did not respond to questions.
4. Larger surveys convey a more accurate impression of the population than smaller surveys.

Ans:

1. **False.**

The results depend on the size(n) of the sample.

The sample size should have at least 30 observations.

1. **False.**

The sampling frame is a list of all the items in the target population from which the

sample is selected.

1. **True.**

Large sample size will result in less standard deviation compared to small sample size.

we can say larger sample is more accurate.

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
3. The parameter of interest
4. The sampling frame
5. The sample size
6. The sampling design
7. Any potential sources of bias or other problems with the survey or sample

Ans:

1. The Population (Total Readers) =9000
2. The Parameter of interest (Camera Rating) = 7.5
3. The Sampling frame: All readers where the survey was conducted.
4. The Sample Size = 225
5. The Sampling Design = It seems to be good response from the readers.
6. If we look on all the ratings given by the readers, then we will know the bias and other problems.
7. For each of the following statements, indicate whether it is True/False. If false, explain why.
8. 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.
9. 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.
10. The 95% Confidence-Interval for *μ* only applies if the sample data are nearly normally distributed.

Ans:

1. **True.**

With the Help of confidence interval, we can identify the population parameter values which are consistent to the collected samples.

1. **False.**

We cannot confirm 100% based on given data. By taking the values more than the confidence interval of 95%

1. **False.**

For this sample size should be more than 30.

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

Ans:

**B.**

The probability of getting a sample mean greater than μ (population mean) is 50%, when our samples follows a normal distribution (It happens only if the population distribution is normal or the sample size is large)

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?
3. 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:

The answers were drawn by using python program Set3Q51.py

1. From above given data,

Sample Mean() = 4.6% = 0.046

Sample Size (n) = 2000

: p ≥ 5%

: p < 5%

**Python Program:**

import numpy as np

from scipy import stats

from scipy.stats import norm

z\_scores=(0.046-0.05)/(np.sqrt((0.05\*(1-0.05))/2000))

z\_scores.round(3)

From the python program, we have Ztest value as -0.821

At 5% of level of Significance, the Z table value is -1.96

Here Ztable value is less than Ztest, so it doesn’t fall in rejected area.

**So, we say that that Mozilla has more than or equal to 5% share of the market.**

1. Given that WebSideStory claims that its sample includes all the daily Internet users. This means that the 4.6% share of the market represents the whole population. **So, we can say that Mozilla has a less than 5% share of the market.**
2. 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?
3. All shipments are between 205 and 295 books.
4. 95% of shipments are between 205 and 295 books.
5. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
6. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.
7. We can be 95% confident that the range 160 to 340 holds the population mean.

Ans:

1. **False.**

Because the interval (205,295) lies for 95% confidence interval only. Not for 100%

1. **False.**

It doesn’t say about all shipments

1. **True.**

95% of intervals will include true population mean.

1. **False.**

We don’t have mean of another sample in this interval.

1. **False.**

We cant say.

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

Ans:

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

Ans:

**Option A.600**

Given,

Margin of Error = 4% = 0.04

For 95% of C.I, Z value from Z table is 1.96

Let us assume, = 0.5 and = 0.5

We have,

ME = Z×

0.04 = 1.96×

Re-Writing the above equation, we have

= => n = = 600.25

Randomly Selected Employers are 600

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

Ans:

**Option C**

For 98% of CI, the Z value is 2.326

0.04 = 2.326×

Re-Writing the above equation, we have

= => n = = 845.355

Minimum sample size is 845.