**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. The appropriate sample size depends on the size of the population, the desired level of precision, and the degree of variability in the population. A fixed percentage of the population size may not be appropriate for all surveys, and a larger sample size does not necessarily produce more representative 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 a list of all elements in the population from which the sample will be selected. It does not include items that did not respond to the survey.

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

**Answer**: False. The accuracy of the survey results depends on a variety of factors, including the sampling method used, the representativeness of the sample, and the quality of the data collection process. Larger sample sizes may produce more precise estimates, but this does not necessarily mean that they provide a more accurate representation of the population.

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**: p=x/n=225/9000=0.025

1. The parameter of interest

**Answer**: sample size, average, scale

1. The sampling frame

**Answer**: 9000

1. The sample size

**Answer**: 225

1. The sampling design

**Answer**: voluntary respond

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

**Answer:** It is possible that only those who were particularly pleased or only who were displeased with the product participated in the survey which can makes the result unreliable.

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

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.

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

**Answer**: False

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**:

Now suppose the population proportion share of market by the Mozilla is = p

Then, Null Hypothesis is $H_0 \text{ is}\ p \geq 5 $ %

{Meaning Mozilla has more than 5 percent or equal to 5 percent share of the market}

Alternate Hypothesis, https://tex.z-dn.net/?f=%24H_A%20%5Ctext%7B%20is%7D%5C%20p%20%3C%205%20%24 %

{Meaning Mozilla has a less than five percent share of the market}

This test statistics which will be used is One-sample z-test for proportions;

https://tex.z-dn.net/?f=TS%20%3D%20%5Cfrac%7B%5Chat%7Bp%7D-p%7D%7B%5Csqrt%7B%5Cfrac%7Bp(1-p)%7D%7Bn%7D%7D%7D%20%5Csim%20N(0%2C1)

Where,  https://tex.z-dn.net/?f=%24%20%5Chat%7Bp%7D%24 = is the sample proportion of share of the market that is grabbed by the Mozilla in year 2004 = 4.6%

n = sample of users = 2,000

So, the test statistics is =   https://tex.z-dn.net/?f=%3D%20%5Cfrac%7B0.046-0.05%7D%7B%5Csqrt%7B%5Cfrac%7B0.05(1-0.05)%7D%7B2000%7D%7D%7D

                                       = https://tex.z-dn.net/?f=%24-0.821%24

Therefore, z-test statistics is -0.821.

 Now, the level of significance at 5 percent, the z table will give the critical value of -1.96 to the left-tailed test.

So we can conclude that the Mozilla has equal to 5% or more than 5 % share of the market.

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: Now it is claimed by WebSideStory that their sample contains all the internet users using daily. Thus it means 4.6 percent share of market shows the entire population.

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

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.
3. 95% of shipments are between 205 and 295 books.
4. The procedure that produced this interval generates ranges that hold the population mean for 95% of samples.
5. If we get another sample, then we can be 95% sure that the mean of this second sample is between 205 and 295.
6. We can be 95% confident that the range 160 to 340 holds the population mean.

**Answer**: Option C is correct.

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**: Option A is correct.

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**: We want to construct a 95% confidence interval for p with a margin of error equal to 4%.

Because there is no estimate of the proportion given, we use p\_bar=0.50 for a conservative estimate.

For a 95% confidence interval, z∗=1.960

z= (1.9600.04)2(0.5) (1−0.5) =600.25

This is the minimum sample size, therefore we should round up to 601. In order to construct a 95% confidence interval with a margin of error of 4%, we should obtain a sample of at least z=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

**Answer**:

Z= 2.5760.04

= 2.326 \* √0.5∗0.5/n

= 2.3262∗0.5∗0.50.042

= 1.35250.0016

= 845.35 = C