**STATISTICS WORKSHEET-9**

**Q1 to Q12 have only one correct answer. Choose the correct option to answer your question.**

1. The owner of a travel agency would like to determine whether or not the mean age of the agency's customers is over 24. If so, he plans to alter the destination of their special cruises and tours. If he concludes the mean age is over 24 when it is not, he makes a \_\_\_\_\_\_\_ error. If he concludes the mean age is not over 24 when it is, he makes a \_\_\_\_\_\_error.

a. Type II; Type II

b. Type I; Type I

c. Type I; Type II

d. Type II; Type I

ANSWER:-c. Type I; Type II

2. Suppose we wish to test H0: μ =53 vs H1: μ > 53. What will result if we conclude that the mean is greater than 53 when its true value is really 55?

a. We have made a Type I error

b. We have made a correct decision

c. We have made a Type II error

d. None of the above are correct

ANSWER:-c. We have made a Type II error

3. The value that separates a rejection region from an acceptance region is called a \_\_\_\_\_\_\_\_\_\_\_.

a. parameter

b. critical value

c. confidence coefficient

d. significance level

ANSWER:-b. critical value

4. A hypothesis test is used to prevent a machine from under filling or overfilling quart bottles of beer. On the basis of sample, the machine is shut down for inspection. A thorough examination reveals there is nothing wrong with the filling machine. From a statistical point of view:

a. Both Type I and Type II errors were made.

b. A Type I error was made.

c. A Type II error was made.

d. A correct decision was made.

ANSWER:-d. A correct decision was made.

5. Suppose we wish to test H0 : μ =21 vs H1 : μ > 21. Which of the following possible sample results gives the most evidence to support H1 (i.e., reject H0)? Hint: Compute Z-score.

a. x = 23 s , = 3

b. x = 19 s , = 4

c. x = 17 s , = 7

d. x = 18 s , = 6

ANSWER:-a. x = 23 s , = 3

6. Given H0: μ = 25, H1: μ ≠ 25, and P-value = 0.041. Do you reject or fail to reject H0 at the 0.01 level of significance?

a. fail to reject H0

b. not sufficient information to decide

c. reject H0

ANSWER:-c. reject H0

7. A bottling company needs to produce bottles that will hold 12 ounces of liquid. Periodically, the company gets complaints that their bottles are not holding enough liquid. To test this claim, the bottling company randomly samples 36 bottles. Suppose the p-value of this test turned out to be 0.0455. State the proper conclusion.

a. At α = 0.085, fail to reject the null hypothesis.

b. At α = 0.035, accept the null hypothesis.

c. At α = 0.05, reject the null hypothesis.

d. At α = 0.025, reject the null hypothesis.

ANSWER:-c. At α = 0.05, reject the null hypothesis.

8. If a hypothesis test were conducted using α = 0.05, for which of the following p-values would the null hypothesis be rejected?

a. 0.100

b. 0.041

c. 0.055

d. 0.060

ANSWER:- b. 0.041

9 . For H1: μ > μ0 p-value is 0.042. What will be the p-value for Ha: μ < μo?

a. 0.084

b. 0.021

c. 0.958

d. 0.042

ANSWER:-b. 0.021

10. The test statistic is t = 2.63 and the p-value is 0.9849. What type of test is this?

a. Right tail

b. Two tail

c. Left tail

d. Can't tell

ANSWER:-b. Two tail

11. The test statistic is z =2.75, the critical value is z = 2.326. The *p*- value is …

a. Less than the significance level

b. Equal to the significance level

c. Large than the significance level

ANSWER:-a. Less than the significance level

12. The area to the left of the test statistic is 0.375. What is the probability value if this is a left tail test?

a. 0.750

b. 0.375

c. 0.1885

d. 0.625

ANSWER:-b. 0.375

**Q13 to Q15 are subjective answers type questions, Answers them in their own words briefly**.

1. What is T distribution and Z distribution?

ANSWER:-Both the T-distribution and Z-distribution are probability distributions that are used in statistical hypothesis testing.

The Z-distribution is a normal distribution with a mean of 0 and a standard deviation of 1. It is commonly used when the population standard deviation is known. Z-distribution is used when the sample size is large, generally greater than 30.

The T-distribution, also known as Student's t-distribution, is used when the population standard deviation is not known and must be estimated from the sample. It is a bell-shaped distribution that has a mean of 0 and a wider spread than the Z-distribution. The shape of the T-distribution changes depending on the degrees of freedom, which are determined by the sample size.

In summary, the Z-distribution is used when the population standard deviation is known and the sample size is large, while the T-distribution is used when the population standard deviation is not known and the sample size is small.

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1. Is the T distribution normal?

ANSWER:-The T-distribution is similar in shape to the normal distribution, but it has heavier tails and a lower peak. Unlike the normal distribution, the shape of the T-distribution depends on the degrees of freedom, which are determined by the sample size.

As the sample size increases, the T-distribution approaches the normal distribution. When the sample size is very large, the T-distribution becomes indistinguishable from the normal distribution. Therefore, the T-distribution can be thought of as a family of distributions that approaches the normal distribution as the sample size increases.

1. What does the T distribution tell us?

ANSWER:-The T-distribution is a probability distribution that is used in statistical inference to estimate population parameters when the sample size is small and the population standard deviation is unknown. Specifically, it is used when the population standard deviation is estimated from the sample standard deviation.

The T-distribution tells us the probability of getting a particular t-value, given the sample size and the degrees of freedom. It is a bell-shaped curve that is similar in shape to the normal distribution, but has heavier tails and a lower peak.

The T-distribution is used to calculate confidence intervals and perform hypothesis testing for population means when the sample size is small (typically less than 30). It allows us to account for the extra uncertainty that comes from estimating the population standard deviation from the sample standard deviation, and thus helps us make more accurate inferences about the population parameters.