WORKSHEET STATISTICS WORKSHEET-9

**Q-1 to Q-12 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

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

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

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.**

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

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**

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.

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

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

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

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

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

**Q-13 to Q-15 are subjective answers type questions, Answers them in their own words briefly.**

13.What is T distribution and Z distribution?

Ans: The t-distribution and the z-distribution are both probability distributions that are used in statistical hypothesis testing. However, they differ in a few key ways.

The Z-distribution (also known as the standard normal distribution) is a continuous probability distribution that is used when the population variance is known, or when the sample size is large (typically greater than 30). The distribution has a mean of zero and a standard deviation of one. The Z-distribution is often used in hypothesis testing for means, proportions, and differences between means.

The t-distribution (also known as the Student's t-distribution) is also a continuous probability distribution, but is used when the population variance is unknown and the sample size is small (typically less than 30). The distribution has a bell-shaped curve, similar to the normal distribution, but with heavier tails. The t-distribution has a mean of zero, but the standard deviation varies depending on the sample size and the degrees of freedom (df). The t-distribution is often used in hypothesis testing for means and differences between means.

In summary, the Z-distribution is used when the population variance is known or when the sample size is large, while the t-distribution is used when the population variance is unknown and the sample size is small

14.Is the T distribution normal?

Ans: The t-distribution is similar to the normal distribution in shape, but it is not the same as the normal distribution. While the normal distribution is a continuous probability distribution with a fixed mean and variance, the t-distribution has a mean of zero and a varying standard deviation that depends on the sample size and degrees of freedom.

When the sample size is large (typically greater than 30), the t-distribution becomes very similar to the normal distribution, with a mean of zero and a standard deviation of 1. In fact, when the sample size is infinitely large, the t-distribution converges to the normal distribution. However, for smaller sample sizes, the t-distribution has heavier tails than the normal distribution, which means that it has a higher probability of extreme values occurring in the sample.

Therefore, while the t-distribution shares some properties with the normal distribution, it is a distinct distribution that is specifically designed for small sample sizes and unknown population variances.

15.What does the T distribution tell us?

: The t-distribution is a probability distribution that is used in statistical inference to help determine if the means of two groups are significantly different from each other. Specifically, the t-distribution is used in hypothesis testing to determine if the difference between two means is statistically significant, or if it could have occurred by chance.

The t-distribution tells us the probability of obtaining a particular sample mean difference between two groups, assuming that the null hypothesis (the hypothesis that there is no significant difference between the groups) is true. If the probability of obtaining the sample mean difference is very low, we can reject the null hypothesis and conclude that the difference between the groups is statistically significant.

The t-distribution is also used to calculate confidence intervals for the difference between two means. The confidence interval is a range of values within which we can be confident that the true population mean difference falls with a certain level of certainty. The t-distribution is used to calculate the width of the confidence interval, which is influenced by the sample size and the level of confidence desired.

In summary, the t-distribution is a tool that is used to test for significant differences between two groups by analyzing their means, and to calculate the precision of our estimate of the difference between the two means using confidence intervals.