

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

2. Suppose we wish to test $H_0: \mu = 53$ vs $H_1: \mu > 53$. 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 $H_0: \mu = 21$ vs $H_1: \mu > 21$. Which of the following possible sample results gives the most evidence to support H_1 (i.e., reject H_0)? 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 $H_0: \mu = 25$, $H_1: \mu \neq 25$, and P-value = 0.041. Do you reject or fail to reject H_0 at the 0.01 level of significance?

- a. fail to reject H_0**
- b. not sufficient information to decide
- c. reject H_0

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.
- At $\alpha = 0.085$, fail to reject the null hypothesis.
 - At $\alpha = 0.035$, accept the null hypothesis.
 - At $\alpha = 0.05$, reject the null hypothesis.
 - At $\alpha = 0.025$, reject the null hypothesis.
8. If a hypothesis test were conducted using $\alpha = 0.05$, for which of the following p-values would the null hypothesis be rejected?
- 0.100
 - 0.041
 - 0.055
 - 0.060
9. For $H_1: \mu > \mu_0$ p-value is 0.042. What will be the p-value for $H_a: \mu < \mu_0$?
- 0.084
 - 0.021
 - 0.958
 - 0.042
10. The test statistic is $t = 2.63$ and the p-value is 0.9849. What type of test is this?
- Right tail
 - Two tail
 - Left tail
 - Can't tell
11. The test statistic is $z = 2.75$, the critical value is $z = 2.326$. The p-value is ...
- Less than the significance level
 - Equal to the significance level
 - 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?
- 0.750
 - 0.375
 - 0.1885
 - 0.625

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

13. What is T distribution and Z distribution?

The z-distribution and the T-distribution are both used for inference, but they have different assumptions and applications. The Z-distribution, also called the standard normal distribution, has a mean of 0 and a standard deviation of 1. It is used when the population standard deviation is known or the sample size is large. The T-distribution, also called the Student's T-distribution, is similar to the Z-distribution, but has fatter tails and is sensitive to sample size. It is used when the

population standard deviation is unknown or the sample size is small.

14. Is the T distribution normal?

ANSWER--- It is a type of normal distribution used for smaller sample sizes, where the variance in the data is unknown.

15. What does the T distribution tell us?

ANSWER--- In statistics, the t-distribution is most often used to :

- 1) Find the critical values for a confidence interval when the data is approximately normally distributed.
- 2) Find the corresponding p-value from a statistical test that uses the t-distribution (t-tests, regression analysis).