

PROJECT

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
- 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. $\bar{x} = 23$ s , = 3

b. $\bar{x} = 19$ s , = 4

c. $\bar{x} = 17$ s , = 7

d. $\bar{x} = 18$ 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 WORKSHEET

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 $\alpha = 0.085$, fail to reject the null hypothesis.

b. At $\alpha = 0.035$, accept the null hypothesis.

c. At $\alpha = 0.05$, reject the null hypothesis.

d. 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?

a. 0.100

b. 0.041

c. 0.055

d. 0.060

9 . For $H_1: \mu > \mu_0$ p-value is 0.042. What will be the p-value for $H_a: \mu < \mu_0$?

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

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

13.What is T distribution and Z distribution?

ANSWER:-T distribution and Z distribution are both probability distributions commonly used in statistical Inference. The Z distribution is a normal distribution with a mean of 0 and a standard deviation of 1. It is used in hypothesis testing and confidence interval estimation when the sample size is large and the population standard deviation is known or estimated.

On the other hand ,the T distribution is a family of distributions that resemble the normal distribution but have heavier tails. It is used in hypothesis testing and confidence interval estimation when the sample size is small and/or the population standard deviation is unknown. In other word, the T distribution is used when the population standard deviation is unknown and the sample size is small(typically less than 30).

14.Is the T distribution normal?

ANSWER:- The T distribution is not exactly normal. However , as the sample size increases , the t-distribution approaches the normal distribution. When the sample size is small, the t-distribution has more probability on its tails than the normal distribution , meaning it is more spread out than the normal distribution. As the sample size increases, the t-distribution becomes more similar to the normal distribution, and the difference between the two becomes negligible for practical purposes.

15.What does the T distribution tell us?

ANSWER:- T distribution is a family of distributions that resemble the normal distribution but

have heavier tails. It is used in hypothesis testing and confidence interval estimation when the sample size is small and/or the population standard deviation is unknown. In other word, the T distribution is used when the population standard deviation is unknown and the sample size is small(typically less than 30).

The T distribution is important in statistical inference because it allows us to calculate confidence intervals and conduct hypothesis tests for small sample sizes , which cannot be done using the normal distribution. It also provides a way to quantify the uncertainty associated with estimating the population mean from a sample.