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

a.Type II; Type II

2. Suppose we wish to test H_0: μ =53 vs H_1: 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
b.We have made a correct decision

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

b. Type I error 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

Answer
c. x = 17 s , = 7

6. Given H_0: $\mu = 25$, H_1: $\mu \neq 25$, 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 H_0

Answer

a. fail to 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 $\alpha = 0.085$, 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.

Answer
c.At $\alpha = 0.05$, 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

Answer
b. 0.041

9 . For H_1: $\mu > \mu_0$ p-value is 0.042. What will be the p-value for Ha: $\mu < \mu o$?
a. 0.084
b. 0.021
c. 0.958
d. 0.042

Answer
c. 0.958

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

c.Left 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.

13.What is T distribution and Z distribution?

The Z distribution is a special case of the normal distribution with a mean of 0 and standard deviation of 1. The t-distribution is similar to the Z-distribution, but is sensitive to sample size and is used for small or moderate samples when the population standard deviation is unknown. At large samples, the z and t samples are very similar.

The standard normal or z-distribution assumes that you know the population standard deviation. The *t*-distribution is based on the sample standard deviation.
Z-Distribution: The z-distribution, also called the normal distribution, is used in z-tables for hypothesis testing. These tables should be used if the population standard deviation is known and the sample size is large (greater than or equal to 30).

T-Distribution: The t-distribution is used for estimating parameters for a population if the sample size is small (less than 30) or the population standard deviation is not known.

We will use these steps and definitions to determine whether a z-distribution or t-distribution is appropriate in the following three examples

14.Is the T distribution normal?

Answer

The *t*-distribution is similar to a normal distribution. It has a precise mathematical definition. Instead of diving into complex math, let's look at the useful properties of the *t*-distribution and why it is important in analyses.

- Like the normal distribution, the *t*-distribution has a smooth shape.
- Like the normal distribution, the *t*-distribution is symmetric. If you think about folding it in half at the mean, each side will be the same.
- Like a standard normal distribution (or z-distribution), the *t*-distribution has a mean of zero.
- The normal distribution assumes that the population standard deviation is known. The *t*-distribution does not make this assumption.
- The *t*-distribution is defined by the *degrees of freedom*. These are related to the sample size.
- The *t*-distribution is most useful for small sample sizes, when the population standard deviation is not known, or both.
- As the sample size increases, the *t*-distribution becomes more similar to a normal distribution.
- The *t*-distribution is a type of normal distribution that is used for smaller sample sizes. Normally-distributed data form a bell shape when plotted on a graph, with more observations near the mean and fewer observations in the tails.
- The *t*-distribution is used when data are *approximately* normally distributed, which means the data follow a bell shape but the population variance is unknown. The variance in a *t*-distribution is estimated based on the degrees of freedom of the data set (total number of observations minus 1).
- It is a more conservative form of the standard normal distribution**,** also known as the *z*-distribution. This means that it gives a lower probability to the center and a higher probability to the tails than the standard normal distribution.

15.What does the T distribution tell us?

T-Distribution is a continuous probability distribution. It is used when sample sizes are smaller than the normal distribution, say less than 30. This method identifies the disparity between the sample and population means when the population standard deviation is unknown.

It is used in statistics to determine extreme confidence interval values for a normal distribution with small sample size. Just like normal distributions, the T-Distribution forms a symmetric bell-shaped curve. But T-curves have fatter tails than a normal distribution curve; this depicts extreme confidence interval values. The *t*-distribution, also known as Student's *t*-distribution, is a way of describing data that follow a bell curve when plotted on a graph, with the greatest number of observations close to the mean and fewer observations in the tails.

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