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

Ans: Type I; Type II (option C)

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

Ans:- We have made a Type ll error (option C)

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

Ans. Critical Value(option B)

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.

Ans:- A correct decision was made.(option d)

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

Ans:- x = 23 s , = 3 (option A)

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

Ans:- fail to reject H0(option A)

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.
Ans:- At α = 0.085, fail to reject the null hypothesis (option A)

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
Ans. 0.041 (option-B

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
Ans:- 0.021 (option b)

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
Ans:- two tail test(option B)

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
Ans:- Less than the significance level(option-A

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

Ans:- 0.375 (option B)

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

13.What is T distribution and Z distribution?

Ans : 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.**

Z- Distribution The standard normal distribution is a type of normal distribution**. It appears when a normal random variable has a mean value equals zero and the value of standard deviation equals one. The mean of standard normal distribution is always equal to its median and mode.**

14.Is the T distribution normal?

Ans:- The t-distribution is similar to the normal distribution in that it is a symmetrical, bell-shaped distribution. However, it is not exactly the same as the normal distribution. The t-distribution has more variability than the normal distribution, which means that it has fatter tails. This is because the t-distribution is based on smaller sample sizes than the normal distribution. As the sample size increases, the t-distribution becomes closer to the normal distribution. Therefore, while the t-distribution is not exactly the same as the normal distribution, it is similar and can be used as an approximation of the normal distribution under certain conditions, such as when the sample size is large or the sample standard deviation is close to the population standard deviation

15.What does the T distribution tell us?

Ans:- The t-distribution is a probability distribution that is used in statistical inference to estimate population parameters based on sample statistics. In particular, the t-distribution is used to:
1. Construct confidence intervals for population means when the population standard deviation is unknown and must be estimated from the sample data.
2. Test hypotheses about population means when the population standard deviation is unknown and must be estimated from the sample data.
The t-distribution is also used to account for the increased uncertainty that arises from estimating the population standard deviation from the sample data. As the sample size increases, the tdistribution becomes closer to the normal distribution