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: 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

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 : μ =21 vs H_1 : μ > 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: μ = 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

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 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

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?
Both the T-distribution and the Z-distribution are probability distributions 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 to test hypotheses about the population mean, given a known population standard deviation, or to estimate a confidence interval for the population mean. The Z-distribution is used when the sample size is large, typically 30 or greater.
The T-distribution is similar to the Z-distribution but is used when the population standard deviation is unknown or when the sample size is small, typically less than 30. The T-distribution is also a bell-shaped curve, but it has more area in the tails, which means that it has more variability and less precision than the Z-distribution. The T-distribution has a mean of 0 and a standard deviation that depends on the sample size and degrees of freedom.
In summary, the Z-distribution is used when the sample size is large and the population standard deviation is known,

while the T-distribution is used when the sample size is small or the population standard deviation is unknown.

13. Is the T distribution normal?

The t-distribution is not exactly normal, but it is similar in shape to the normal distribution. The t-distribution is a family of distributions, each of which has a slightly different shape. The shape of the t-distribution depends on the sample size and the degrees of freedom. When the sample size is large (typically, when $n \geq 30$), the t-distribution becomes very similar in shape to the normal distribution. However, when the sample size is small, the t-distribution has heavier tails than the normal distribution, which means that extreme values are more likely to occur.

15. What does the T distribution tell us?

The t-distribution is a probability distribution that is used to estimate population parameters when the sample size is small or when the population standard deviation is unknown. Specifically, the t-distribution is used to calculate confidence intervals and perform hypothesis tests on the mean of a normally distributed population when the sample size is small (typically, $n < 30$) or when the population standard deviation is unknown.

The t-distribution is similar in shape to the normal distribution, but has heavier tails when the sample size is small. This means that extreme values are more likely to occur in a t-distribution than in a normal distribution, which makes sense because when we have a small sample size, we have less information about the population, so we are more uncertain about the estimates of the population parameters. The t-distribution takes into account this uncertainty and provides wider confidence intervals and more conservative hypothesis tests than the normal distribution.