STATISTICS WORKSHEET-8

Q1 to Q12 have only one correct answer. Choose the correct option to answer your question.

1. In hypothesis testing, type II error is represented by β and the power of the test is 1−β then β is:
   a. The probability of rejecting H_0 when H_1 is true
   b. The probability of failing to reject H_0 when H_1 is true
   c. The probability of failing to reject H_1 when H_0 is true
   d. The probability of rejecting H_0 when H_1 is true

2. In hypothesis testing, the hypothesis which is tentatively assumed to be true is called the
   a. correct hypothesis
   b. null hypothesis
   c. alternative hypothesis
   d. level of significance

3. When the null hypothesis has been true, but the sample information has resulted in the rejection of the null, a _____has been made
   a. level of significance
   b. Type II error
   c. critical value
   d. Type I error

4.For finding the p-value when the population standard deviation is unknown, if it is reasonable to assume that the population is normal, we use
   a. the z distribution
   b. the t distribution with n - 1 degrees of freedom
   c. the t distribution with n + 1 degrees of freedom
   d. none of the above

5. A Type II error is the error of
   a. accepting Ho when it is false
   b. accepting Ho when it is true
   c. rejecting Ho when it is false
   d. rejecting Ho when it is true

6. A hypothesis test in which rejection of the null hypothesis occurs for values of the point estimator in either tail of the sampling distribution is called
   a. the null hypothesis
   b. the alternative hypothesis
   c. a one-tailed test
   d. a two-tailed test

7. In hypothesis testing, the level of significance is
a. the probability of committing a Type II error
b. the probability of committing a Type I error
c. the probability of either a Type I or Type II, depending on the hypothesis to be tested
d. none of the above

8. In hypothesis testing, b is
a. the probability of committing a Type II error
b. the probability of committing a Type I error
c. the probability of either a Type I or Type II, depending on the hypothesis to be test
d. none of the above

9. When testing the following hypotheses at an α level of significance
H_0: p = 0.7
H_1: p > 0.7
The null hypothesis will be rejected if the test statistic Z is
a. $z > z_\alpha$
b. $z < z_\alpha$
c. z < -z
d. none of the above

10. Which of the following does not need to be known in order to compute the P-value?
a. knowledge of whether the test is one-tailed or two-tail
b. the value of the test statistic
c. the level of significance
d. All of the above are needed

11. The maximum probability of a Type I error that the decision maker will tolerate is called the
a. level of significance
b. critical value
c. decision value
d. probability value

12. For t distribution, increasing the sample size, the effect will be on
a. Degrees of Freedom
b. The t-ratio
c. Standard Error of the Means
d. All of the Above

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

13. What is Anova in SPSS?

ANOVA (Analysis of Variance) in SPSS is a statistical technique used to analyze the differences among means of two or more groups of data. It is used to test the null hypothesis that the means of the groups are equal.

In SPSS, ANOVA can be performed using either the "Analyze" menu or the "General Linear Model" (GLM) procedure. The GLM procedure provides more flexibility in specifying the model, including the ability to include categorical and continuous predictors, as well as interaction effects.

To perform ANOVA in SPSS, the following steps can be followed:

Open the dataset in SPSS.
Select "Analyze" from the top menu and then select "Compare Means" and then "One-Way ANOVA".
Select the dependent variable and the grouping variable.
Click "Options" to specify the post-hoc tests and effect sizes.
Click "OK" to run the ANOVA.
The output of ANOVA in SPSS provides information on the mean and standard deviation of each group, the overall F-test, and the results of the post-hoc tests. It also includes effect size measures such as partial eta-squared and Cohen's d, which can be used to assess the practical significance of the results.

14. What are the assumptions of Anova?

The assumptions of ANOVA (Analysis of Variance) are as follows:

1. Normality: The dependent variable should follow a normal distribution within each group.
2. Homogeneity of Variance: The variance of the dependent variable should be equal across all groups.
3. Independence: Observations should be independent of each other within and between groups.
4. Random Sampling: Observations should be randomly sampled from the population.
5. Interval or Ratio Data: The dependent variable should be measured on an interval or ratio scale.

If these assumptions are not met, the results of ANOVA may not be reliable, and alternative statistical tests may be necessary.

15. What is the difference between one way Anova and two way Anova?

One-way ANOVA and two-way ANOVA are both statistical techniques used to test for significant differences between groups. The main difference between them is the number of independent variables involved in the analysis.

One-way ANOVA is used to test the null hypothesis that there is no significant difference between the means of two or more groups. It involves only one independent variable (also known as a factor) that has two or more levels. For example, a one-way ANOVA can be used to compare the mean scores of students who study different majors.

On the other hand, two-way ANOVA is used to test the null hypothesis that there is no significant interaction between two independent variables (factors) and their effect on a dependent variable. It involves two independent variables, each with two or more levels. For example, a two-way ANOVA can be used to test the effect of both major and gender on the mean scores of students.

In summary, the main difference between one-way ANOVA and two-way ANOVA is the number of independent variables used in the analysis. One-way ANOVA is used for a single factor with two or more levels, while two-way ANOVA is used for two factors with two or more levels.