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 method used to test the equality of two or more group means. It is used to determine whether there are any statistically significant differences between the means of two or more groups.

In SPSS, ANOVA is performed using the GLM (General Linear Model) procedure. The GLM procedure can be used

to perform a wide range of analyses, including ANOVA, ANCOVA (Analysis of Covariance), and MANOVA (Multivariate Analysis of Variance).

To perform ANOVA in SPSS, the user must first enter the data into the program and then choose the appropriate test from the menu. The user must then specify the variables to be analyzed, the grouping variable, and the dependent variable. SPSS will then calculate the ANOVA table, which displays the results of the analysis, including the F-value, p-value, and degrees of freedom.

ANOVA in SPSS is commonly used in fields such as psychology, sociology, and biology to compare the means of different groups and determine whether there are any significant differences between them.

14. What are the assumptions of Anova?

The ANOVA is a statistical test that compares the means of three or more groups to determine if they are significantly different. The following are the assumptions of ANOVA:

Independence: The observations within each group should be independent.

Normality: The data within each group should be normally distributed.

Homogeneity of Variance: The variances of the groups being compared should be equal.

Random Sampling: The groups being compared should be randomly selected from the population.

If these assumptions are not met, then the ANOVA results may be invalid. Violations of these assumptions can lead to inaccurate results and conclusions.

There are several methods to check the assumptions of ANOVA, such as:

Normality test: This can be done using graphical methods such as histograms and normal probability plots, or formal tests such as the Shapiro-Wilk test.

Homogeneity of Variance test: This can be done using Levene's test or Bartlett's test.

Residual plots: This involves plotting the residuals (the difference between the observed value and the predicted value) against the predicted values to check for patterns.

If the assumptions are not met, there are alternative methods that can be used such as non-parametric tests.

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

One-way ANOVA and two-way ANOVA are both statistical methods used to test for significant differences between the means of two or more groups. The key difference between the two tests is in the number of independent variables or factors being analyzed.

In one-way ANOVA, there is only one independent variable or factor being analyzed, and the data is divided into multiple groups based on this single factor. For example, if a researcher wants to test the effect of three different types of fertilizer on plant growth, the fertilizer would be the independent variable and the growth would be the dependent variable. The data would be divided into three groups, one for each type of fertilizer.

In contrast, two-way ANOVA involves the analysis of two independent variables or factors simultaneously, and how their interaction affects the dependent variable. For example, if a researcher wants to test the effect of both fertilizer

type and soil type on plant growth, there would be two independent variables, fertilizer and soil type, and the data would be divided into six groups (one for each combination of fertilizer and soil type).

Therefore, the main difference between one-way ANOVA and two-way ANOVA is that the latter takes into account the interaction between two independent variables, whereas the former only considers the effect of a single independent variable. Additionally, two-way ANOVA tends to be more complex and require larger sample sizes than one-way ANOVA.