# STATISTICS WORK SHEET SET 01 Assignment08

***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 H0 when H1 is true
b. The probability of failing to reject H0 when H1 is true
c. The probability of failing to reject H1 when H0 is true
d. The probability of rejecting H0 when H1 is true

Answer: b. The probability of failing to reject H0 when H1 is true

In hypothesis testing, there are two types of errors: type I error and type II error. Type I error occurs when the null hypothesis (H0) is rejected when it is actually true, and type II error occurs when the null hypothesis is not rejected when it is actually false.

The probability of making a type II error is represented by β. Therefore, β is the probability of failing to reject H0 when H1 (alternative hypothesis) is true. This means that the test has not been able to detect a true effect, and the null hypothesis is erroneously accepted.

The power of the test is 1-β, which represents the probability of correctly rejecting H0 when H1 is true. Thus, β and power are complementary to each other. A high power of the test implies a low probability of making a type II error, and vice versa.

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

Answer: b. null hypothesis

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

Answer: 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

Answer: b. the t distribution with n - 1 degrees of freedom

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

Answer: a. accepting Ho when it is false

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

Answer: 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

Answer: b. the probability of committing a Type I error

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

Answer: a. the probability of committing a Type II error

9. When testing the following hypotheses at an α level of significance H0: p = 0.7 H1: 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

Answer: a. $z > z\alpha$

The null hypothesis H0: p = 0.7 is tested against the alternative hypothesis H1: p > 0.7 at an α level of significance.

If the sample proportion is denoted by $\hat{p}$, the test statistic for testing the above hypothesis can be given as:

$z = (\hat{p} - p) / \sqrt{p(1-p)/n}$

where n is the sample size.

Under the null hypothesis, the test statistic follows a standard normal distribution. To reject the null hypothesis at an α level of significance, we need the test statistic to be large enough.

Since the alternative hypothesis is one-tailed ($p > 0.7$), we reject the null hypothesis if the test statistic Z is greater than $z\alpha$, where $z\alpha$ is the critical value obtained from the standard normal distribution table at the $\alpha$ level of significance.

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

Answer: c. the level of significance

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

Answer: a. level of significance

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

Answer: a. Degrees of Freedom

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

13. What is Anova in SPSS?

Answer:

ANOVA (Analysis of Variance) in SPSS is a statistical method used to test for differences between two or more groups or sets of data. It is commonly used to analyze experimental data, but can also be used for observational data.

In ANOVA, the null hypothesis is that there is no significant difference between the means of the groups being compared. The alternative hypothesis is that at least one group mean is different from the others. ANOVA tests this hypothesis by comparing the variation between the group means to the variation within each group.

SPSS provides several types of ANOVA, including one-way ANOVA, factorial ANOVA, and repeated measures ANOVA. One-way ANOVA is used when there is only one independent variable, while factorial ANOVA is used when there are two or more independent variables. Repeated measures ANOVA is used when the same subjects are tested under different conditions.

In SPSS, ANOVA can be performed through the "Analyze" menu. The user can select the appropriate type of ANOVA from the options provided, and then specify the dependent and independent variables, as well as any additional factors or covariates. SPSS then provides output that includes the F-value, p-value, and other relevant statistics to help interpret the results of the analysis.

14. What are the assumptions of Anova?

Answer:

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

1. Independence: The observations in each group should be independent of each other.
2. Normality: The data within each group should be normally distributed.
3. Homogeneity of variances: The variance of the data in each group should be approximately equal.

Violation of these assumptions may lead to incorrect conclusions and interpretations of the ANOVA results. If these assumptions are not met, then alternative methods such as non-parametric tests may be used.

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

Answer:

The main difference between one-way ANOVA and two-way ANOVA is the number of factors or independent variables involved in the analysis.

One-way ANOVA is used when there is only one factor or independent variable being studied, and its effect on a single dependent variable is being examined. For example, we could use one-way ANOVA to determine if there is a significant difference in the average test scores of students from three different schools.

Two-way ANOVA, on the other hand, is used when there are two factors or independent variables being studied, and their combined effects on a single dependent variable are being examined. For example, we could use two-way ANOVA to determine if there is a significant difference in the average test scores of students from three different schools who are taught by two different teachers.

In summary, one-way ANOVA is used to test for differences in one factor or independent variable, while two-way ANOVA is used to test for differences in two factors or independent variables.