STATISTICS WORKSHEET-8

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

    Ans: b. The probability of failing to reject H0 when H1 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

    Ans: 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

    Ans: 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

    Ans: 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

    Ans: 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

    Ans: 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

    Ans: 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

    Ans: 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

    Ans: a. $z > z\alpha$

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

    Ans: c. the level of significance

11. The maximum probability of a Type I error that the decision maker will tolerate is called

   a. level of significance
   b. critical value
   c. decision value
   d. probability value

   Ans: 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

   Ans: d. All of the Above

13. What is Anova in SPSS?

   ANOVA - Analysis Of Variance is used to compare differences of means among more than 2 groups. It is done by looking at variation in the data and where that variation is found(hence its name).
   ANOVA compares the amount of variation between groups with the amount of variation within groups

   NULL Hypothesis, typically is that all means are equal
   The independent variables are categorical
   Dependent variables are continues

   Steps to conduct Anova test:

   1. Calculate the sample mean of each group: A sample mean represents the average value of a group

   2. Calculate the Grand mean: Grand mean represents the average value of sample means of different groups or mean of all the observations combined

   3. Calculate Sum of Squares to find variations Between, Within and Total of the groups: Sum of squares gives the deviation from the mean, which is know as variation

   4. Find the degrees of freedom for Between, Within and Total of the groups: Degrees of vary freedom refers to the maximum numbers of logically independent values that have the freedom to in a data set.

5. Calculate the mean squared variance for Between and Within Groups: The Mean Squared error gives the average error in a data set. To find the mean squared error, we have to divide the sum of squares by the degrees of freedom

6. Calculate the F statistic: The statistic which measures the extent of difference between the means of different samples or how significantly the means differ is called the F-statistic or F-Ratio. It gives us a ratio of the effect we are measuring (in the numerator) and the variation associated with the effect (in the denominator)
   F-statistic: Variation between sample means / Variation within samples

7. Calculate the P value from the derived F value: Whenever we perform ANOVA, we will be analysing the F statistic and P value(By F Distribution Calculator or Log table)
   The larger the F-statistic, the greater the greater the variation between sample means relative to the variation within the samples
   Thus, the larger the F-statistic, the greater the evidence that there is a difference between the group means.
   If the p-value is less than $\alpha = .05$, we reject the null hypothesis of the ANOVA and conclude that there is a statistically significant difference between the means of the groups
   Otherwise, if the p-value is not less than $\alpha = .05$ then we fail to reject the hypothesis and conclude that we do not have sufficient evidence to say that there is a statistically significant difference between the means of the groups.

14. What are the assumptions of Anova?

   There are three primary assumptions in ANOVA

   ➔ Each group sample is drawn from a normally distributed population

   ➔ All populations have a common variance

   ➔ All samples are drawn independently of each other

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

   There are two types of ANOVA test

   ➔ **One Way ANOVA**: It is used to compare the means of two independent groups using the F-distribution. The one-way ANOVA is used to determine whether there are any statistically significant differences between the means of three or more independent groups.

   ➔ **Two-way ANOVA**: It is used when we have two independent variables. It is an extension of one-way ANOVA. In one-way, we have one independent variable affecting a dependent variable, with a two-way ANOVA, there are two independents. It is utilized to observe the interaction between the two factors and tests the effect of two factors at the same time