

## STATISTICS WORKSHEET-3

**Q1 to Q9 have only one correct answer. Choose the correct option to answer your question.**

**1. Which of the following is the correct formula for total variation?**

- a) Total Variation = Residual Variation – Regression Variation
- b) Total Variation = Residual Variation + Regression Variation**
- c) Total Variation = Residual Variation \* Regression Variation
- d) All of the mentioned

**2. Collection of exchangeable binary outcomes for the same covariate data are called outcomes.**

- a) random
- b) direct
- c) binomial**
- d) none of the mentioned

**3. How many outcomes are possible with Bernoulli trial?**

- a) 2**
- b) 3
- c) 4
- d) None of the mentioned

**4. If  $H_0$  is true and we reject it is called**

- a) Type-I error**
- b) Type-II error
- c) Standard error
- d) Sampling error

**5. Level of significance is also called:**

- a) Power of the test
- b) Size of the test
- c) Level of confidence**
- d) Confidence coefficient

**6. The chance of rejecting a true hypothesis decreases when sample size is:**

- a) Decrease
- b) Increase**
- c) Both of them
- d) None

**7. Which of the following testing is concerned with making decisions using data?**

- a) Probability
- b) Hypothesis**
- c) Causal
- d) None of the mentioned

**8. What is the purpose of multiple testing in statistical inference?**

- a) Minimize errors
- b) Minimize false positives
- c) Minimize false negatives
- d) All of the mentioned**

**9. Normalized data are centred at and have units equal to standard deviations of the original data**

- a) 0**
- b) 5

c) 1

d) 10

**Q10 and Q15 are subjective answer type questions, Answer them in your own words briefly.**

## **10. What Is Bayes' Theorem?**

**Answer:---** Bayes' Theorem states that the conditional probability of an event, based on the occurrence of another event, is equal to the likelihood of the second event given the first event multiplied by the probability of the first event.

Bayes theorem provides a way to calculate the probability of a hypothesis based on its prior probability, the probabilities of observing various data given the hypothesis, and the observed data itself.

$$P(A/B) = \frac{P(B/A).P(A)}{P(B)}$$

## **11. What is z-score?**

**Answer:--** A z-score is an example of a standardized score. A z-score measures how many standard deviations a data point is from the mean in a distribution. A Z-score is a numerical measurement that describes a value's relationship to the mean of a group of values. If a Z-score is 0, it indicates that the data point's score is identical to the mean score. The z-score is particularly important because it tells you not only something about the value itself, but also where the value lies in the distribution.

### **Calculating Z Scores**

Use the following format to find a z-score:  $z = \frac{X - \mu}{\sigma}$ . This formula allows you to calculate a z-score for any data point in your sample. a z-score is a measure of how many standard deviations a data point is away from the mean..

## 12. What is t-test?

**Answer:--** A t-test is a statistical test that compares the means of two samples. It is used in hypothesis testing, with a null hypothesis that the difference in group means is zero and an alternate hypothesis that the difference in group means is different from zero.

There are three t-tests to compare means: a one-sample t-test, a two-sample t-test and a paired t-test.

## 13. What is percentile?

**Answer:--** a percentile is a term that describes how a score compares to other scores from the same set. While there is no universal definition of percentile, it is commonly expressed as the percentage of values in a set of data scores that fall below a given value.

example, if you score 75 points on a test, and are ranked in the 85<sup>th</sup> percentile, it means that the score 75 is higher than 85% of the scores.

## 14. What is ANOVA?

**Answer:--** Analysis of variance (ANOVA) is an analysis tool used in statistics that splits an observed aggregate variability found inside a data set into two parts. The different groups/levels must have **equal sample sizes**.

There are different types of ANOVA tests. The two most common are a “One-Way” and a “Two-Way.”

### 3 Types of ANOVA analysis

- Dependent Variable – Analysis of variance must have a dependent variable that is continuous.
- Independent Variable – ANOVA must have one or more categorical independent variable like Sales promotion.
- Null hypothesis – All means are equal.

## 15. How can ANOVA help?

**Answer:--** ANOVA is helpful for testing three or more variables. It is similar to multiple two-sample t-tests. However, it results in fewer type I errors and is appropriate for a range of issues. ANOVA groups differences by comparing the means of each group and includes spreading out the variance into diverse sources.

Real-world application of ANOVA test

The researchers can take note of the sugar levels before and after medication for each medicine and then to understand whether there is a statistically significant difference in the mean results from the medications, they can use one-way ANOVA..