TASK 10

1- Types of statistical tests and when to use each type with examples?

- Statistical tests are used to make inferences about populations based on sample data. The choice of which statistical test to use depends on various factors, including the research question, the type of data you have, and the assumptions underlying each test. Here are some common types of statistical tests and when to use them, along with examples:

1- T-Tests:

Independent Samples T-Test: Used to compare means between two independent groups. Example: Comparing the mean exam scores of two different classes to see if there's a significant difference.

Paired Samples T-Test: Used to compare means between two related groups (e.g., before and after measurements). Example: Testing whether a new drug has a significant effect by comparing the blood pressure of patients before and after treatment.

Analysis of Variance (ANOVA):

One-Way ANOVA: Used to compare means of three or more independent groups. Example: Testing if there's a significant difference in the average income among people from different professions (e.g., doctors, lawyers, engineers).

Two-Way ANOVA: Extends one-way ANOVA to two independent categorical variables. Example: Examining the influence of both gender and age on job satisfaction.

Regression Analysis:

Simple Linear Regression: Used to model the relationship between a dependent variable and one independent variable. Example: Predicting a person's weight (dependent) based on their height (independent).

Multiple Linear Regression: Extends simple linear regression to model the relationship between a dependent variable and multiple independent variables. Example: Predicting a house's price (dependent) based on variables like square footage, number of bedrooms, and location (independents).

2- What is P-value?

- The p-value, short for "probability value," is a fundamental concept in statistics that quantifies the strength of evidence against a null hypothesis. It helps researchers determine whether the results of a statistical test are statistically significant or not.

Here's what a p-value represents:

Definition:

The p-value is the probability of observing a test statistic as extreme as, or more extreme than, the one computed from the sample data, assuming that the null hypothesis is true.

Null Hypothesis (H0):

The null hypothesis is a statement of no effect, no difference, or no association. It represents the status quo or the default assumption. Researchers typically aim to test whether the null hypothesis should be rejected.

Alternative Hypothesis (Ha):

The alternative hypothesis is a statement that contradicts the null hypothesis. It represents the research hypothesis or the claim researchers want to support.

Significance Level (α):

 Researchers choose a significance level, often denoted as α (alpha), which is the threshold for deciding whether to reject the null hypothesis. Common values for α include 0.05 or 0.01, representing a 5% or 1% chance of making a Type I error (incorrectly rejecting a true null hypothesis).