

Types of Statistical Tests

&&

When to Use Each Type with Examples

1. T-Test:

Used to compare the means of two groups to determine if they are statistically different.

Example: Comparing the average test scores of students who received tutoring (Group A) and those who did not (Group B) to see if tutoring had a significant impact.

2. Chi-Square Test:

Use: Used to test the association or independence between two categorical variables.

Example: Examining if there is a significant relationship between smoking habits (smoker or non-smoker) and the incidence of lung cancer.

3. ANOVA (Analysis of Variance):

Use: Used to compare means of more than two groups to determine if there are significant differences among them.

Example: Comparing the average test scores of students across multiple schools (School A, School B, School C) to see if there's a significant difference in performance.

4. Regression Analysis:

Use: Used to model and analyze the relationship between a dependent variable and one or more independent variables.

Example: Analyzing how the price of a house (dependent variable) is influenced by factors like square footage, number of bedrooms, and location (independent variables).

5. Paired T-Test:

Use: Used when you want to compare two related groups, such as before and after measurements.

Example: Testing if there is a statistically significant difference in the blood pressure of patients before and after a new medication.

6. Wilcoxon Rank-Sum Test (Mann-Whitney U Test):

Use: Non-parametric test for comparing two independent groups when assumptions of the t-test are violated.

Example: Comparing the exam scores of two groups of students, where the data is not normally distributed.

7. Kruskal-Wallis Test:

Use: Non-parametric alternative to ANOVA for comparing more than two independent groups.

Example: Comparing the performance of different age groups (under 18, 18-35, 35 and above) in a physical fitness test.

Part 2

What is P-Value?

The p-value (probability value) is a statistical measure that helps assess the evidence against a null hypothesis in a hypothesis test. It quantifies the likelihood of obtaining observed results (or more extreme results) when the null hypothesis is true. In other words, it tells you how likely it is that your results occurred by random chance.

A smaller p-value indicates stronger evidence against the null hypothesis. Typically, if the p-value is less than a chosen

significance level (often denoted as alpha, e.g., 0.05), you reject the null hypothesis.

A small p-value doesn't prove that an effect is practically significant or scientifically meaningful; it only indicates statistical significance. Other factors like effect size and context should also be considered.

The p-value is a crucial tool in hypothesis testing that helps researchers make informed decisions about whether to accept or reject a null hypothesis based on the strength of evidence in the data.