Hypothesis Testing

Terms, Terminologies,

Testing

Types and Methods

What is a **statistical hypothesis**?

It is a statement, report , or claim regarding a characteristic of one or more population parameters.

What is a **hypothesis testing**?

It is a process that uses sample statistics, based on sample evidence and probability, to test a claim about the value of a population parameters.

What is a **null hypothesis**?

It is a statistical hypothesis that contains a statement of equality, such as $\leq$, $\geq$, or $=$.

It is denoted by H_0.

What is an **alternative hypothesis**?

It is the complement of the null hypothesis and must contain a statement of inequality, such as $>$, $<$, or $\neq$.

It is denoted by H_1.

What is a **type I error**?

It takes place when a true null hypothesis is rejected.

What is a **type II error**?

It takes place when a false null hypothesis is supported.

How many **outcomes** are there from **hypothesis testing**?

There are **four possible outcomes** from **hypothesis testing**.

What are the **Hypothesis Testing Four Outcomes**?

Conclusion & Reality $\rightarrow$ $\downarrow$	H_0 is true.	H_0 is false.
Support H_0	Correct Decision	Type II Error
Reject H_0	Type I Error	Correct Decision

What is a **significance level**?

It is the probability of making **Type I Error** and it is denoted by the Greek letter alpha α where $0 < \alpha < 1$.

What are the **probabilities of making errors**?

$$\begin{aligned} P(\textbf{Type I Error}) &= \alpha \\ P(\textbf{Type II Error}) &= 1 - \alpha \end{aligned}$$

What are the main **Keywords**?

The parameter is $\cdots$		
Verbal Statement for H_0	Mathematical Statement for H_0 & H_1	Verbal Statement for H_1
equal to k k exactly k	$H_0 : \cdots = k$ $H_1 : \cdots \neq k$	not equal to k different from k not k
greater than or equal to k at least k not less than k	$H_0 : \cdots \geq k$ $H_1 : \cdots < k$	less than k below k fewer than k
less than or equal to k at most k not more than k	$H_0 : \cdots \leq k$ $H_1 : \cdots > k$	greater than k above k more than k

How many different **testing types** are there?

There are **three testing types** when performing **hypothesis testing**.

When	We Should Perform
$H_1 : \cdots \neq k$	**Two–Tail Test**
$H_1 : \cdots < k$	**Left–Tail Test**
$H_1 : \cdots > k$	**Right–Tail Test**

How many different **testing methods** are there?

There are **three commonly used methods** for performing **hypothesis testing**.

1) Traditional Method

When Computed Test Statistic Is In	Then	And	We Should
Non-Critical Region	H_0 is valid	H_1 is invalid	Support H_0 and Reject H_1
Critical Region	H_0 is invalid	H_1 is valid	Reject H_0 and Support H_1

2) P-Value Method

When P-Value Is	Then	And	We Should
Greater Than α	H_0 is valid	H_1 is invalid	Support H_0 and Reject H_1
Less Than Or Equal To α	H_0 is invalid	H_1 is valid	Reject H_0 and Support H_1

3) Confidence-Interval Method

Use $(1-2\alpha)100\%$ Confidence Level For One Tail Test Only.

When the parameter Is	Then	And	We Should
within the confidence interval	H_0 is valid	H_1 is invalid	Support H_0 and Reject H_1
not within the confidence interval	H_0 is invalid	H_1 is valid	Reject H_0 and Support H_1