



HYPOTHESIS TESTING

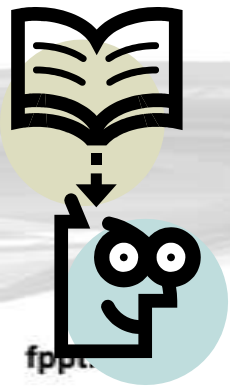
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Inferential Statistics



- Inferential statistics to make judgments of the probability that an observed difference between groups is a dependable one or one that might have happened by chance.





There are two main methods used in inferential statistics:

- Estimation &
- Hypothesis testing



What is Hypothesis



- A Hypothesis is the statement or an assumption about relationships between variables.

or

- A Hypothesis is a tentative explanation for certain behaviors, phenomenon or events that have occurred or will occur.



Interesting Hypothesis

- Bankers assumed high-income earners are more profitable than low-income earners.
- Old clients were more likely to diminish CD balances by large amounts compared to younger clients.

This was nonintrusive because conventional wisdom suggested that older clients have a larger portfolio of assets and seek less risky investments

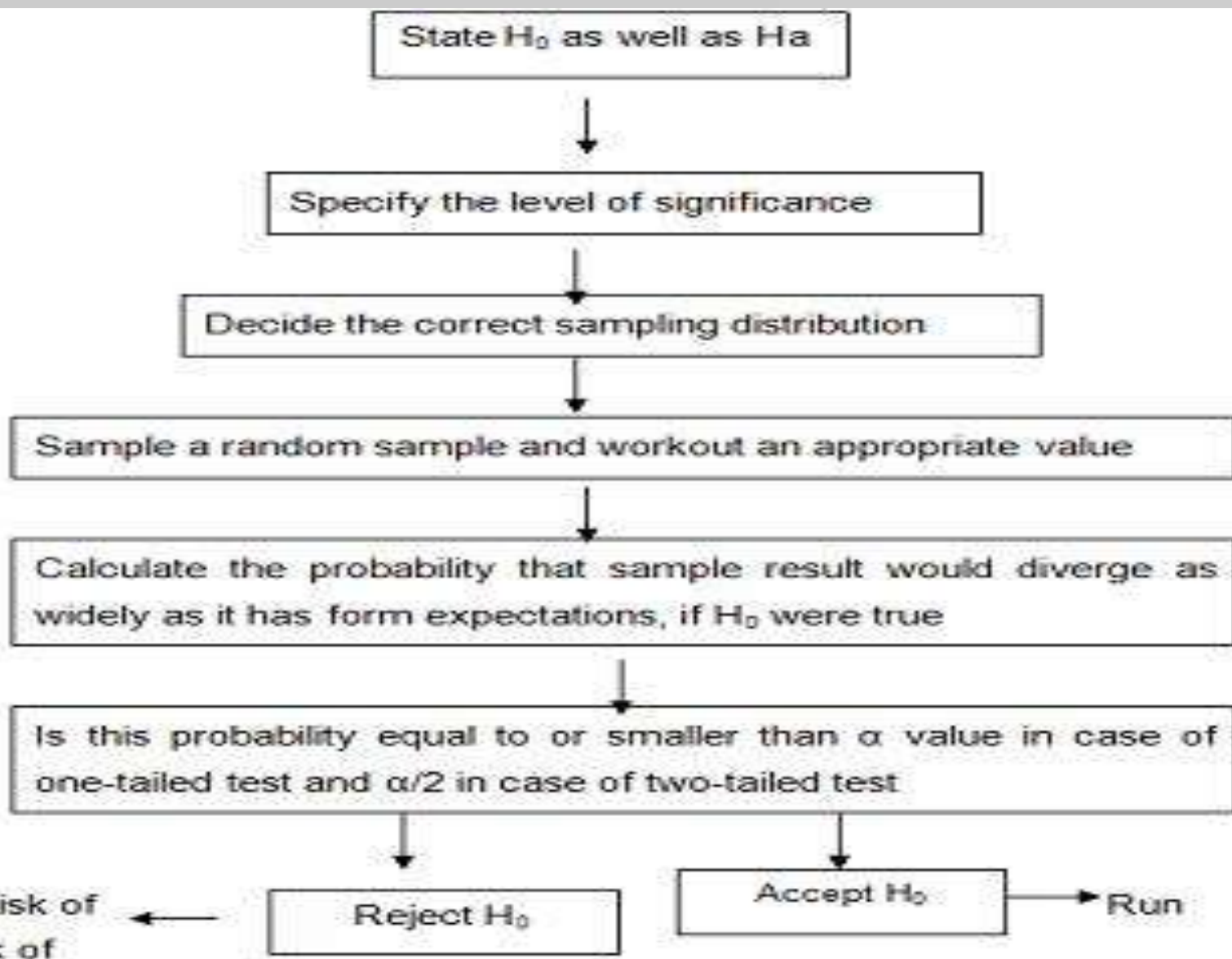


Criteria for Hypothesis Construction

- It should be empirically testable, whether it is right or wrong.
- It should be specific and precise.
- The statements in the hypothesis should not be contradictory.
- It should specify variables between which the relationship is to be established.
- It should describe one issue only.



Steps in Hypothesis Testing



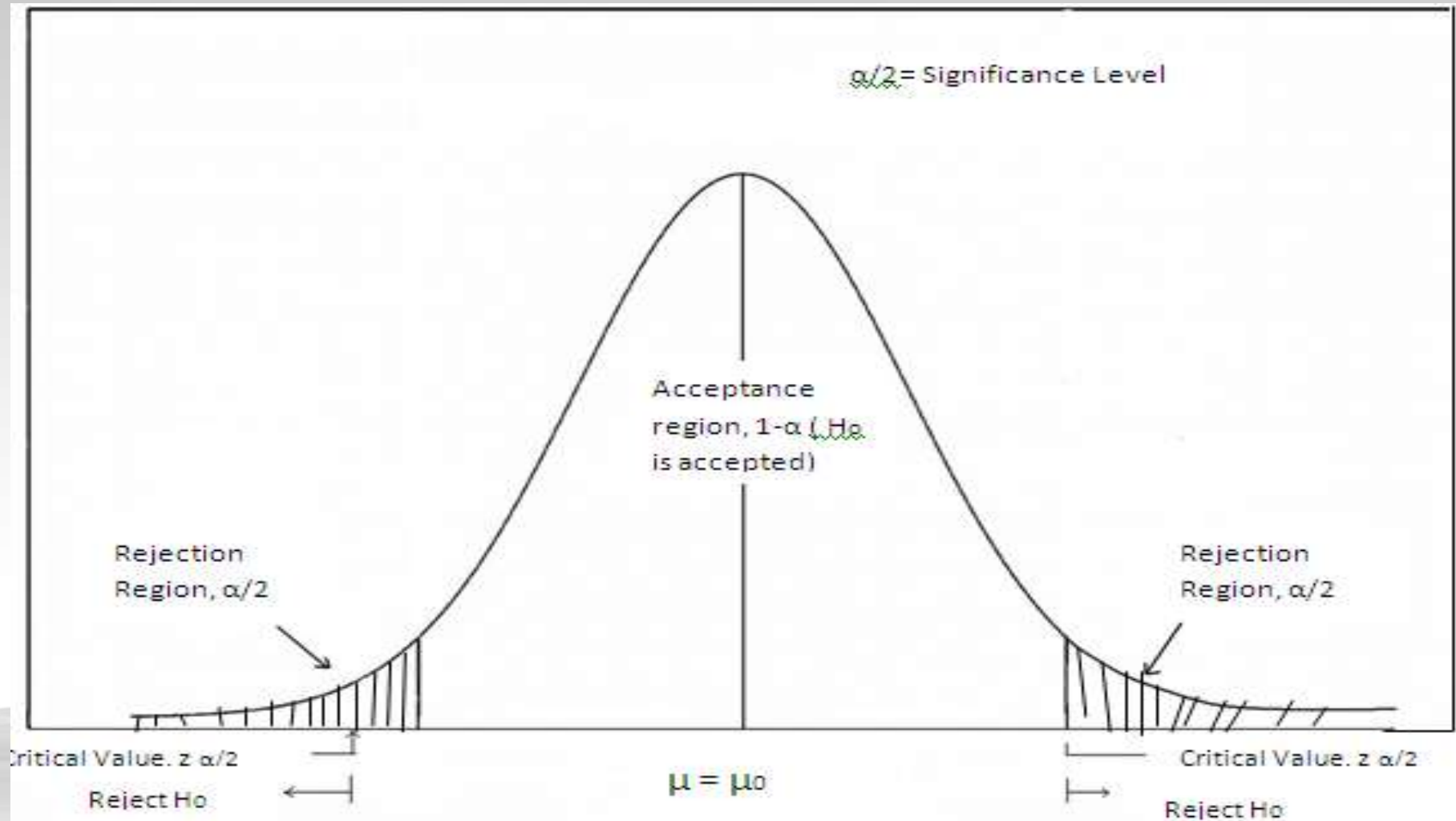
Types of Hypothesis

- **Null Hypothesis (H_0)**
- **Alternative Hypothesis (H_a or H_1)**

Each of the following statements is an example of a null hypothesis and alternative hypothesis.

$H_0 : \mu = \mu_0$	$H_a : \mu \neq \mu_0$
$H_0 : \mu \leq \mu_0$	$H_a : \mu > \mu_0$
$H_0 : \mu \geq \mu_0$	$H_a : \mu < \mu_0$

Establish Critical or Rejection region



Areas of Accepted and Rejection of H_0 (Two -Tailed test)

Select the Suitable Test of significance or Test Statistic

- Whether the test involves one sample, two samples, or samples?
- Whether two or more samples used are independent or related?
- Is the measurement scale nominal, ordinal, interval, or ratio?



The choice of a probability distribution of a sample statistics is guided but the sample size n and the value of population standard deviation σ as shown in the table.



Sample Size n	Population Standard Deviation σ	
	Known	Unknown
$n > 30$	Normal Distribution	Normal Distribution
$n \leq 30,$	Normal Distribution	t-distribution

Is the Population normal?

No

Yes

Is the Sample Size, $n \geq 30$?

No

Yes

Use a non-parametric test

Use Z-test statistic

Is the Population Standard deviation, σ known?

No

Yes

Use t-test statistic

Use z-test statistic

$$Z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}} \quad \text{or} \quad \frac{\bar{X} - \mu}{s / \sqrt{n}}$$

$$t = \frac{\bar{X} - \mu}{s / \sqrt{n}}$$

$$Z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}}$$

Formulate a Decision Rule to Accept Null Hypothesis

- Accept H_0 if the test statistic value falls within the area of acceptance.
- Reject otherwise.



ERRORS IN HYPOTHESIS TESTING



Types of error		
Type of decision	H_0 true	H_0 false
Reject H_0	Type I error (α)	Correct decision ($1-\beta$)
Accept H_0	Correct decision ($1-\alpha$)	Type II error (β)

Summary of Certain Values for Sample Statistics Z

Rejection region	Level of Significance, α percent			
	$\alpha = 0.10$	$\alpha = 0.05$	$\alpha = 0.01$	$\alpha = 0.005$
One - tailed region	± 1.28	± 1.645	± 2.33	± 2.58
Two - tailed region	± 1.645	± 1.96	± 2.58	± 2.81



THANK YOU

