

INSTITUTE OF AERONAUTICAL ENGINEERING



(Autonomous)

Dundigal, Hyderabad -500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE PPT

Course Name	PROBABILITY AND STATISTICS
Course Code	AHS010
Programme	B.Tech
Semester	II
Course Coordinator	Mr. J Suresh Goud
Course Faculty	Ms. P Srilatha
Lecture Number	40
Topic Covered	Type I and Type II Errors
Course Learning Outcome's	Understand the concept of hypothesis testing in real-world problem to selecting the best means to stop smoking.

TYPE I AND TYPE II ERRORS

TYPES OF ERRORS:

There are two types of Errors

1. Type-I Error
2. Type-II Error

TYPE-I ERROR:

A Type I error (sometimes called a Type 1 error), is the incorrect rejection of a true null hypothesis. The alpha symbol, α , is usually used to denote a Type I error.

TYPE-II ERROR:

A Type II error (sometimes called a Type 2 error) is the failure to reject a false null hypothesis. The probability of a type II error is denoted by the beta symbol β .

EXAMPLE:

Hypothesis: "The evidence produced before the court proves that this man is guilty."

Null hypothesis (H_0): "This man is innocent."

A type I error occurs when convicting an innocent person. A type II error occurs when letting a guilty person go free.

A positive correct outcome occurs when convicting a guilty person. A negative correct outcome occurs when letting an innocent person go free.

CRITICAL REGION:

The critical region is the region of values that corresponds to the rejection of the null hypothesis at some chosen probability level. The shaded area under the Student's t distribution curve is equal to the level of significance. The critical values are tabulated and thus obtained from the Student's t table or another appropriate table. If the absolute value of the t statistic is larger than the tabulated value, then t is in the critical region.

ONE TAILED AND TWO TAILED TESTS:

The statistical tests used will be one tailed or two tailed depending on the nature of the null hypothesis and the alternative hypothesis.

PROCEDURE OF TEST OF HYPOTHESIS:

Step 1: Null Hypothesis (H_0): Setup Null Hypothesis

Step 2: Alternative Hypothesis (H_1): Setup Alternative Hypothesis

Step 3: Level of Significance(α): Choose z_α value from the table

Step 4: Test Statistic(Z): $Z = \frac{t - E(t)}{S.E(t)}$

Step 5: Conclusion:

If $|z| < z_\alpha$ then We accept null hypothesis

If $|z| > z_\alpha$ then We reject null hypothesis