Types of Errors

No matter which hypothesis represents the claim, always begin the hypothesis test **assuming that the null hypothesis is true**.

At the end of the test, one of two decisions will be made:

1. Reject the null hypothesis, or
2. Accept the null hypothesis.

A **type I error** occurs if the null hypothesis is rejected when it is true. (α error)

A **type II error** occurs if the null hypothesis is accepted when it is false. (β error)

Types of Errors

- As we all (hopefully) remember, results of hypothesis tests fall into one of four scenarios:

	H_0 is true	H_0 is false
We reject H_0	Type I Error	OK
We don't reject H_0	OK	Type II Error

Explaination with example:

- The jury is instructed to assume the person is innocent, and only decide that the person is guilty if the evidence convinces them of such.

- When there is a favored assumption, the presumed innocence of the person in this case, and the assumption is true, but the jury decides it is false and declares that the person is guilty, we have a so-called Type I error.

- Conversely, if the favored assumption is false, i.e., the person is really guilty, but the jury declares that it is true, that is that the person is innocent, then we have a so-called Type II error.

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Example:
Statesville college claims that 94% of their graduates find employment within six months of graduation. What will a type I or type II error be?

H_0: $p = 0.94$ (Claim)
H_a: $p \neq 0.94$

- **A type I error is rejecting the null when it is true.**

The population proportion is actually 0.94, but is rejected. (We believe it is not 0.94.)

- **A type II error is accepting the null when it is false.**

The population proportion is not 0.94, but is accepted. (We believe it is 0.94.)