

# STA130 Winter 2022, Tutorial 4

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# Type I and Type II errors

	fail to reject $H_0$	reject $H_0$
$H_0$ true	Correct decision	type-1 error
$H_0$ false	type-2 error	Correct decision

- $P[\text{Type-1 error}] = \alpha = P[\text{reject } H_0 | H_0 \text{ true}]$
- $P[\text{Type-2 error}] = \beta = P[\text{fail to reject } H_0 | H_0 \text{ false}]$
- $\text{Power of a test} = 1 - \beta = P[\text{reject } H_0 | H_0 \text{ false}]$

**Credits:** Prof. Shahriar Shams at UofT

# An example

A criminal court considers two opposing claims about a defendant: they are either innocent or guilty.

In the Canadian legal system, the role of the prosecutor is to present convincing evidence that the defendant is not innocent.

Lawyers for the defendant attempt to argue that the evidence is not convincing enough to rule out that the defendant could be innocent.

If there is not enough evidence to convict the defendant and they are set free, the judge generally does not deliver a verdict of “innocent”, but rather of “not guilty”.

**Credits:** Rebecca Christensen - our fabulous head TA

# Under the previous context...

What are the null & alternate hypotheses?

What does it mean to reject the null?

Describe what a type II error is

Describe what a type I error is

**Thank you, and see you next week!**