~~Two Op~~

- Suppose we reject H_0 whenever p-value $\leq \alpha$
- Note: ~~there are some cases where no~~ we should never do this

Decision \ Truth	H_0 is true	H_0 is false
~~[illegible]~~ reject H_0	Type I Error	☺
fail to reject H_0	☺	Type II Error

$P(\text{Type I Error}) = P(\text{p-value} \leq \alpha \mid H_0 \text{ true})$

- In most cases, $P(\text{Type I Error}) = \alpha$ exactly
- For discrete r.v.'s, sometimes $P(\text{Type I Error}) < \alpha$

Ex: ~~Suppose~~

In LRT warm-up, suppose $\alpha = 0.1$.
What is $P(\text{Type I Error} \mid H_0 \text{ true})$?

Suppose $\alpha = 0.3$.
What is $P(\text{Type I Error} \mid H_0 \text{ true})$?

$P(\text{Type II Error} \mid H_0 \text{ is false})$ denoted by β.

Suppose $\alpha = 0.3$, and H_0 false. Find β.

Suppose $\alpha = 0.5$. Find β.

$P(\text{Reject } H_0 \mid H_0 \text{ is false}) = 1 - P(\text{Type II Error} \mid H_0 \text{ is false}) = 1 - \beta$

Suppose $\alpha = 0.3$ and H_0 false. Find the power

Suppose $\alpha = 0.5$ and H_0 false. Find the power.