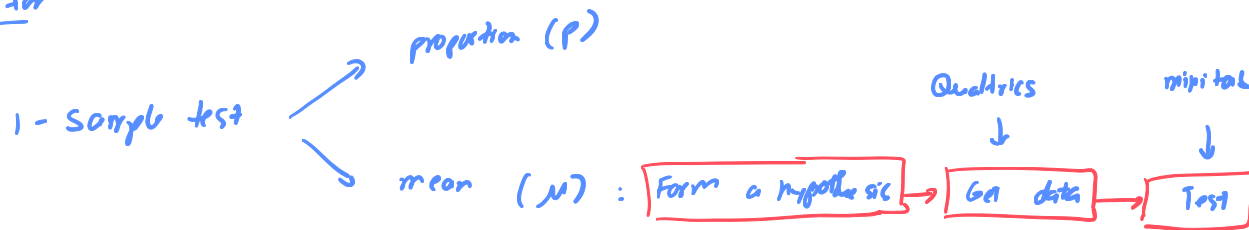


Type I, Type II errors and Significant Levels

So for



Next: Type 1 and Type 2 Errors.

Example: H_1 : Smoking increase the risk of lung cancer.

→ collect data

→ Find $p\text{-value} = .017$ [At 5% significant level]

① Since $p\text{-value} < .05 \Rightarrow$ There is sufficient evidence that smoking increase lung cancer. Reject H_0





↑
significant level (α)

② If significant level is $.01$, then $p\text{-value}$ of $.17$ is still considered "large".

This means There is insufficient evidence that smoking increase the risk of lung cancer. (At 1% significant level)

(*) Outcomes of a test

The truth

	H_0 is correct	H_0 is not correct
(1) There is sufficient evidence for H_1 . Reject H_0	Type 1 error (A)  (α)	correct !! (B) 
(2) There is insufficient evidence for H_1 . Fail to reject H_0	correct !! (D) 	Type 2 error (C) 

Let say the significant level $\alpha = .05$. Then there is 5% chance you will commit Type 1 error with the outcome of the test.

Example 1:

(In your report:

$$p\text{-value} = \underline{0.0125}$$

Suppose we want to test a hypothesis that exercises has positive affect on GPA. We collect data and find $p\text{-value} = 0.0125$. Give the outcomes the test with significant level of .05, .02, and .01.

① $\alpha = .05$: $p\text{-value} < \alpha$
(.0125) (.05)

→ Reject H_0 . There is sufficient evidence that exercises has positive effect on GPA

② $\alpha = .02$: $p\text{-value} < \alpha$

⇒ Reject H_0 . There is sufficient evidence for H_1 (same conclusion as above)

③ $\alpha = .01$: $p\text{-value} > \alpha$

→ Fail to reject H_0 . There is INSUFFICIENT evidence for H_1

Example 2:

State in sentences Type 1 and Type 2 when test the hypothesis that drinking any amount of alcohol before driving increases crash risk among teen drivers.