Type I, Type II erros and Significant Levels

(a) So far:

1-sample Test ↗ proportional (p)

1-sample Test ↘ mean (μ): $\boxed{\text{Form hypothesis}} \to \boxed{\text{Collect Data}} \to \boxed{\text{Test}}$

Qualtrics ↓ Collect Data

minitab ↓ Test

(*) Outcomes of a test

H_0: Smoking doesn't increase a risk of lung cancer.
H_1: Smoking increases a risk of lung cancer

	H_0 is correct	H_0 is not correct
(1) There is sufficient evidence for H_1. Reject H_0	Type 1 error (α)	correct!
(2) There is not sufficient evidence for H_1. Fail to reject H_0.	correct	Type 2 error (β)

$\begin{cases} H_0 \\ H_1 \end{cases}$ Get data . compute p-value = $\boxed{.017}$

① p-value < .05 $\Rightarrow$ There is sufficient evidence for H_1 . Reject H_0

significant level

(α)

At this significant level, there is 5% the outcome is wrong .

② If the significant level is .01 $(\alpha = .01)$

p - value $> \alpha$. Therefore, the outcome change

There is insufficient evidence for H_1 . Fail to reject H_0 .

Example 1:

.015

Suppose we want to test a hypothesis that exercises has positive affect on GPA. We collect data and find p-value = [redacted]. Give the outcomes the test with significant level of .05, .02, and .01.

① $\alpha = .05$

p-value $< \alpha$ $\Rightarrow$ There is sufficient evidence for H_1. Reject H_0.
(at 5% significant level)

② $\alpha = .02$

p-value $< \alpha$ $\Rightarrow$ There is sufficient evidence that exercises has possitive effect on GPA at 2% significant level

③ $\alpha = .01$

p-value $> \alpha$ $\Rightarrow$ There is insufficient evidence that supports 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.