Type I, Type II erros and Significant Levels

So far

1 - sample test → proportion (p)

1 - sample test → mean (μ) : $\boxed{\text{Form a hypothesis}}$ → $\boxed{\text{Get data}}$ → $\boxed{\text{Test}}$

Qualtrics ↓ (Get data)

minitab ↓ (Test)

Next : Type 1 and Type 2 Errors.

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

→ collect data

→ Find p-value = .017 [At 5% significant level]

① since p-value < .05 ⇒ There is sufficient evidence that smoking increase lung cancer. Reject Ho

significant level (α)

② If significant level is .01, then p-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	D correct!!	C Type 2 error

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

(In your copy:

p-value = 0.0125

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.

α

① $\alpha = .05$: p-value $<$ α

(.015) (.05)

$\Rightarrow$ Reject H_0. There is sufficient evidence that exercises has positive effect on GPA

② $\alpha = .02$: p-value $<$ α

$\Rightarrow$ Reject H_0. There is sufficient evidence for H_1 (same conclusion as above)

③ $\alpha = .01$ p-value $>$ α

$\rightarrow$ 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.