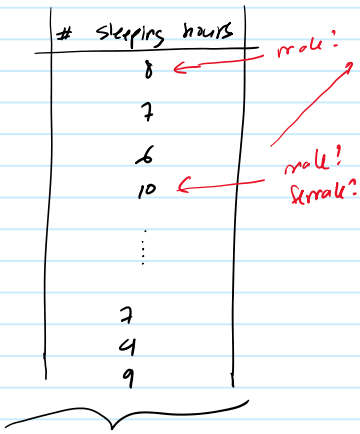
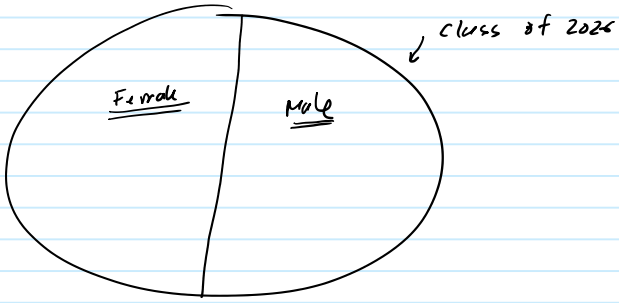
Two-Sample Tests

Monday, February 27, 2023 7:40 PM



H_1: On average students of class '26 sleep more than 7 hours a day } Test 1

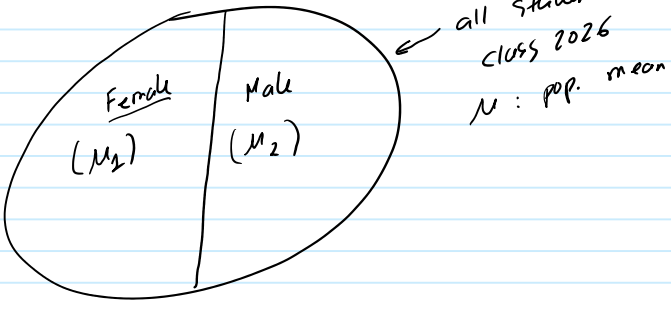


H_1: Female students sleep more than male students ? } Test 2

We would need more data (on gender) to test this
The dataset should look like:

# sleep hours	Gender
8	male
7	female
6	female
10	male
⋮	⋮
7	F
4	M
9	F

This test 2 is called 2-sample test.



H_1 of test 2: Female sleep longer than male

Using μ_1 and μ_2 notation:

$H_1: \mu_1 > \mu_2$

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μ_1: The average sleeping hours for female student class' 26

μ_2: ——————— male ———————

$H_1: \mu_1 - \mu_2 > 0$

means: The difference between the average sleeping hours for female and male students is positive

Note: For 2-sample test, we need to add one more question to the survey to break the population into 2 groups.

For example, the survey for the above example (test 2) should be:

Q1: What is your gender?

Q2: How many hours do you sleep?

Assignment 8:

H_1: There is some difference between male and female in study time.

$H_1: \mu_1 \neq \mu_2$ OR $H_1: \mu_1 - \mu_2 \neq 0$

μ_1 average study time for female

μ_2 average study time for male

μ_1: population mean of studytime when sex = F
μ_2: population mean of studytime when sex = M

Null hypothesis	$H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis	$H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
6.37	386	0.000

P-value < .05 $\Rightarrow$ The data support H_1. There is some difference between male and female in studying time.

Question 2: $H_1: \mu_1 > \mu_2$

OR

$H_1: \mu_1 - \mu_2 > 0$

OR

$H_1: \mu_1 - \mu_2 > 0$

Null hypothesis	$H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis	$H_1: \mu_1 - \mu_2 > 0$

T-Value	DF	P-Value
6.37	386	0.000

P-value $< .05 \Rightarrow$ The data support H_1. Female students have longer study time than male students.

Question 3

μ_1 : The average final grade of students that do not have Internet at home

μ_2 : ——— Do have ———

$H_1: \mu_2 > \mu_1$

OR:

$H_1: \mu_1 - \mu_2 < 0$

Test

Null hypothesis	$H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis	$H_1: \mu_1 - \mu_2 < 0$

T-Value	DF	P-Value
-1.99	94	0.025

P-value $< .05 \Rightarrow$ The data support H_1. Students who have Internet access at home have higher final grade than those who do not have Internet access at home.