Hypothesis Testing

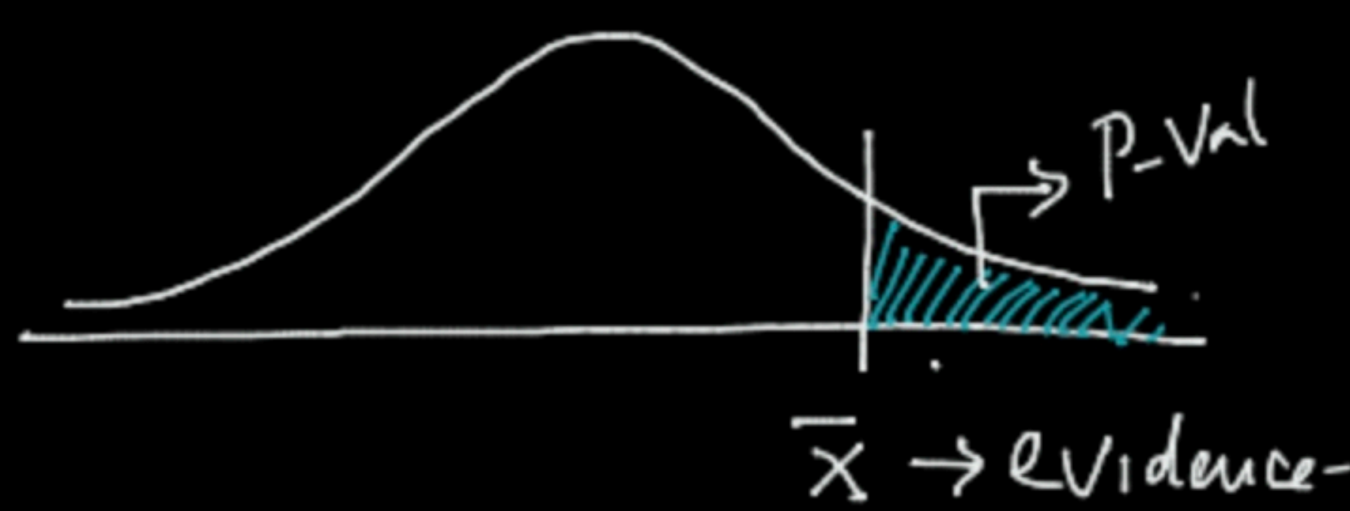
Hypothesis : Assumption without proof.

↳ Ho : opp. of Ha.

Ha : what researcher wants to prove

1. population
2. '=' belongs to Ho.

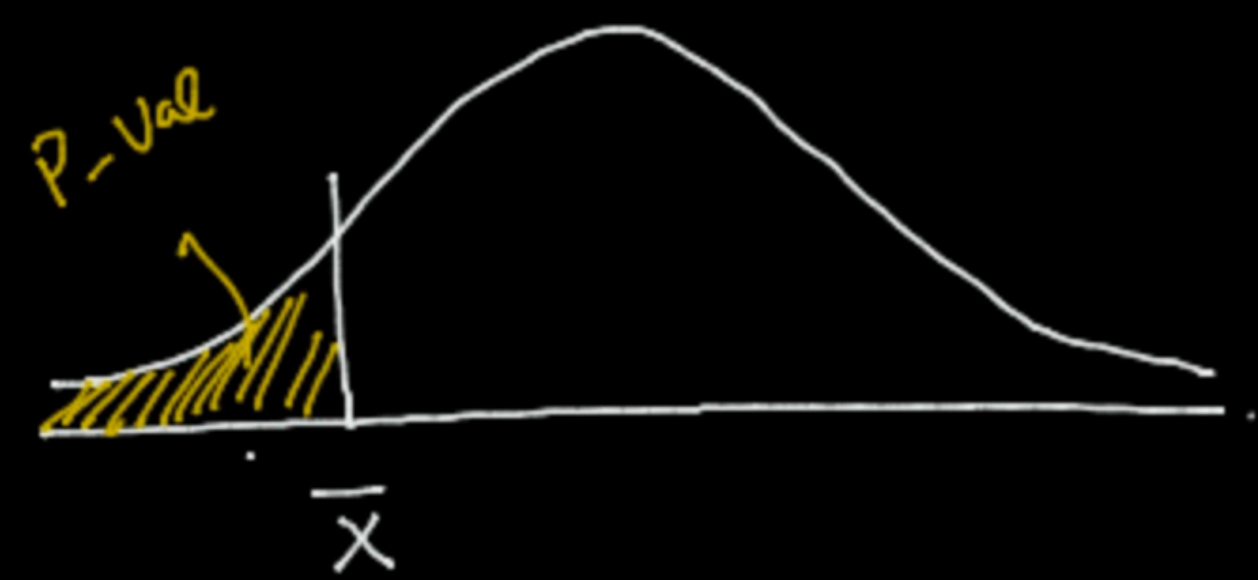
$\boxed{H_a : \mu > x}$



Right tailed test

$P \Leftrightarrow \alpha$

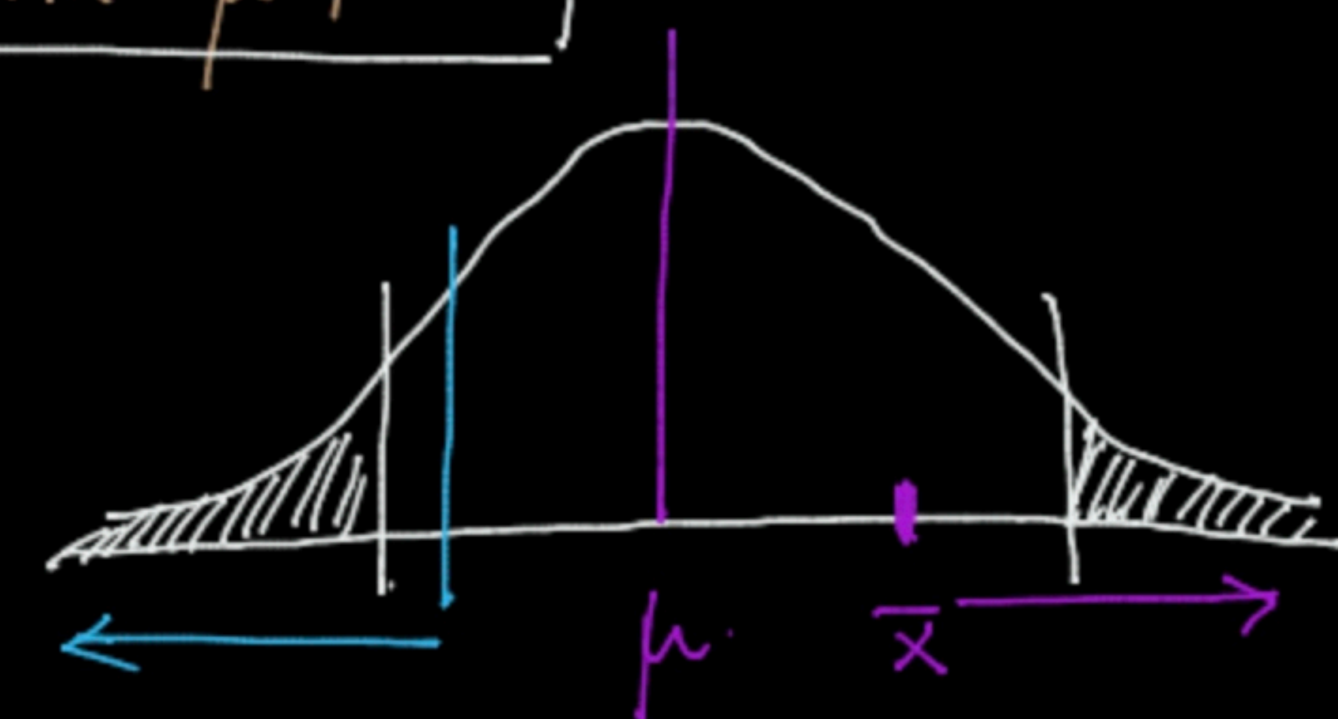
$\boxed{H_a : \mu < x}$



Left tailed test

$P \Leftrightarrow \alpha$

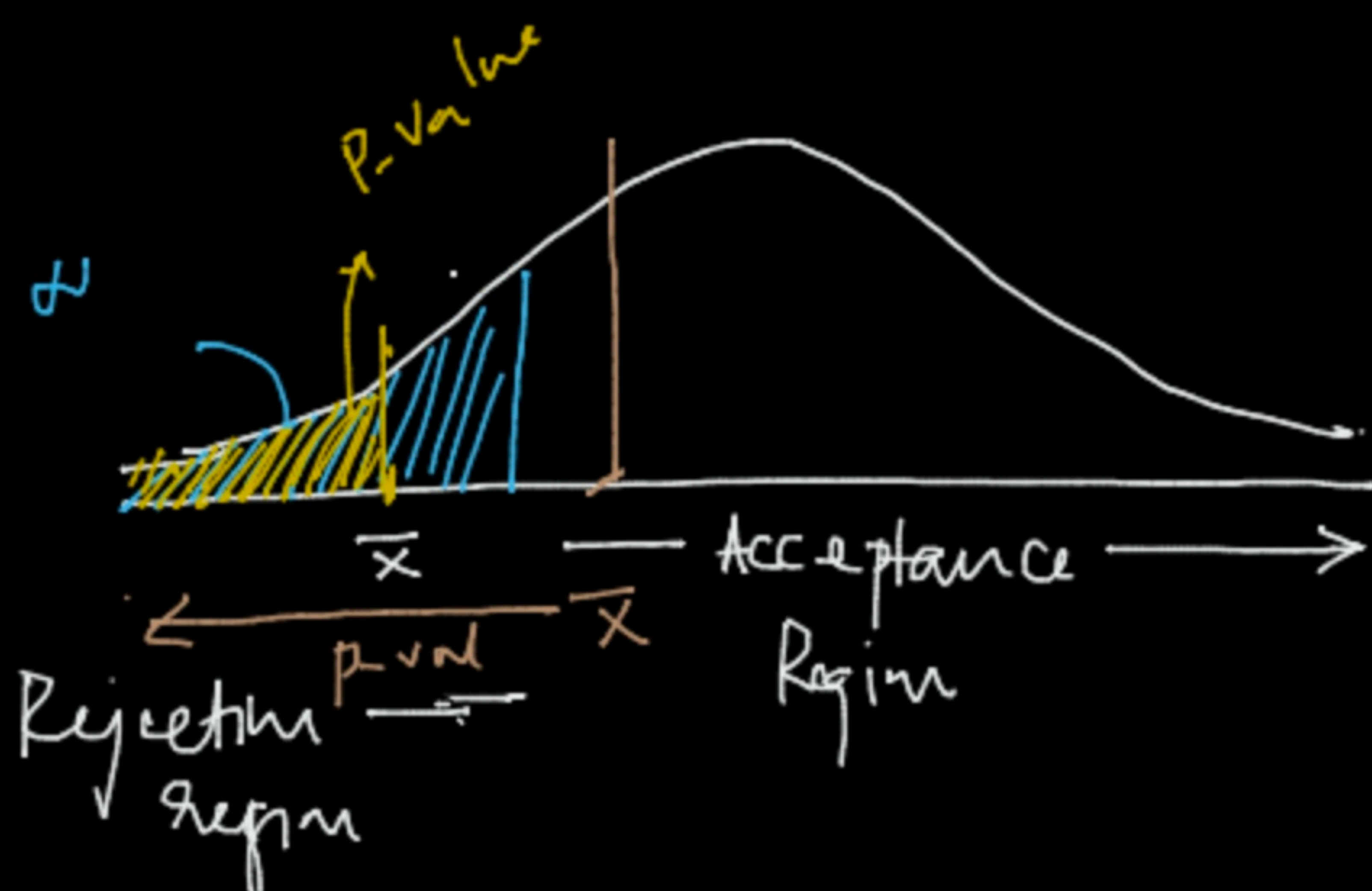
$\boxed{H_a : \mu \neq x}$

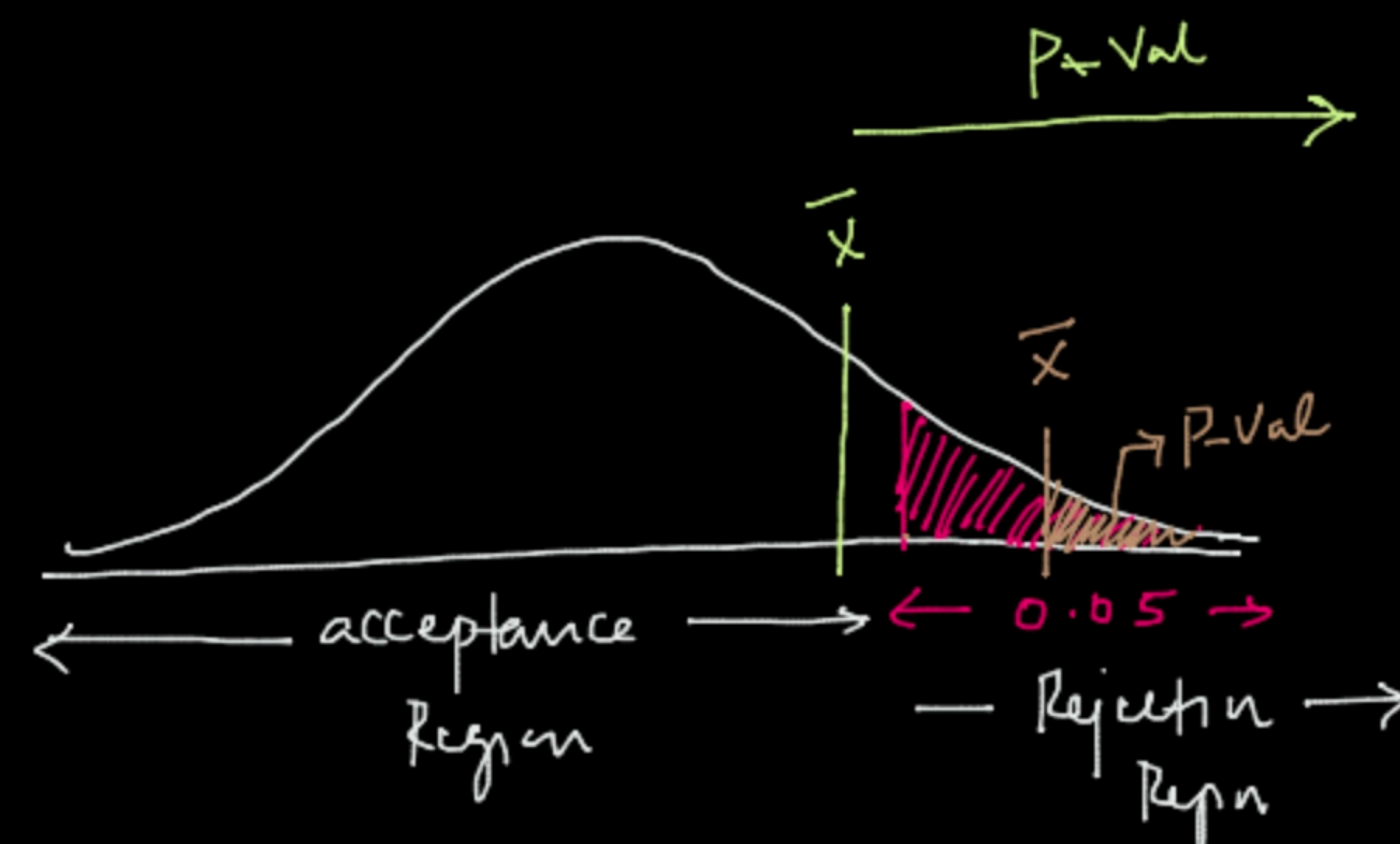


Two tail test

$P \Leftrightarrow \alpha/2$

$\alpha \rightarrow$ area under the curve.





Left tail.

$P < \alpha \rightarrow$ reject H_0

$P > \alpha \rightarrow$

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Steps of hypothesis testing

Step1: Formulate H_0 & H_a

Step2: Set the cut-off.

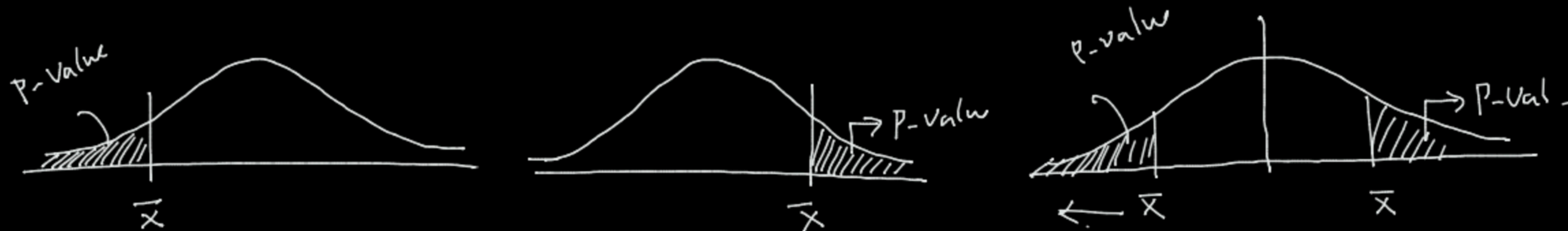
$\alpha = 0.05$.

Step3: Collect evidence from sample

$n \rightarrow$ Sample size

$\bar{x} \rightarrow$ evidence

Step4: find the p-value corresponding to $\bar{x}$



$H_a: \mu < x$

$H_a: \mu > x$

$H_a: \mu \neq x$

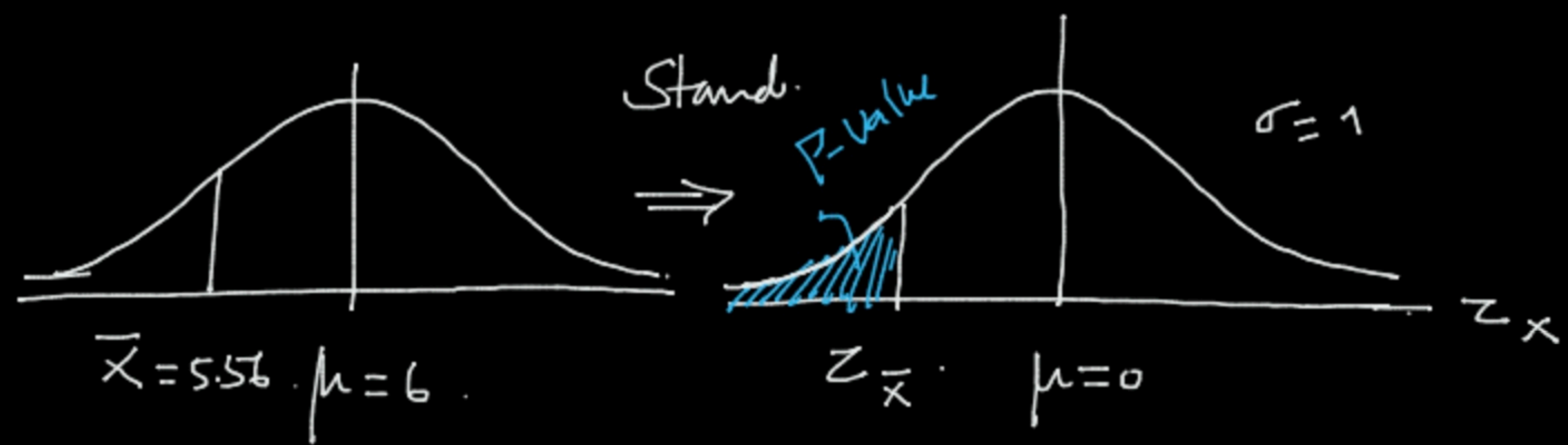
Step5: Compare p-val and α

$p < \alpha \longrightarrow$ Reject H_0.

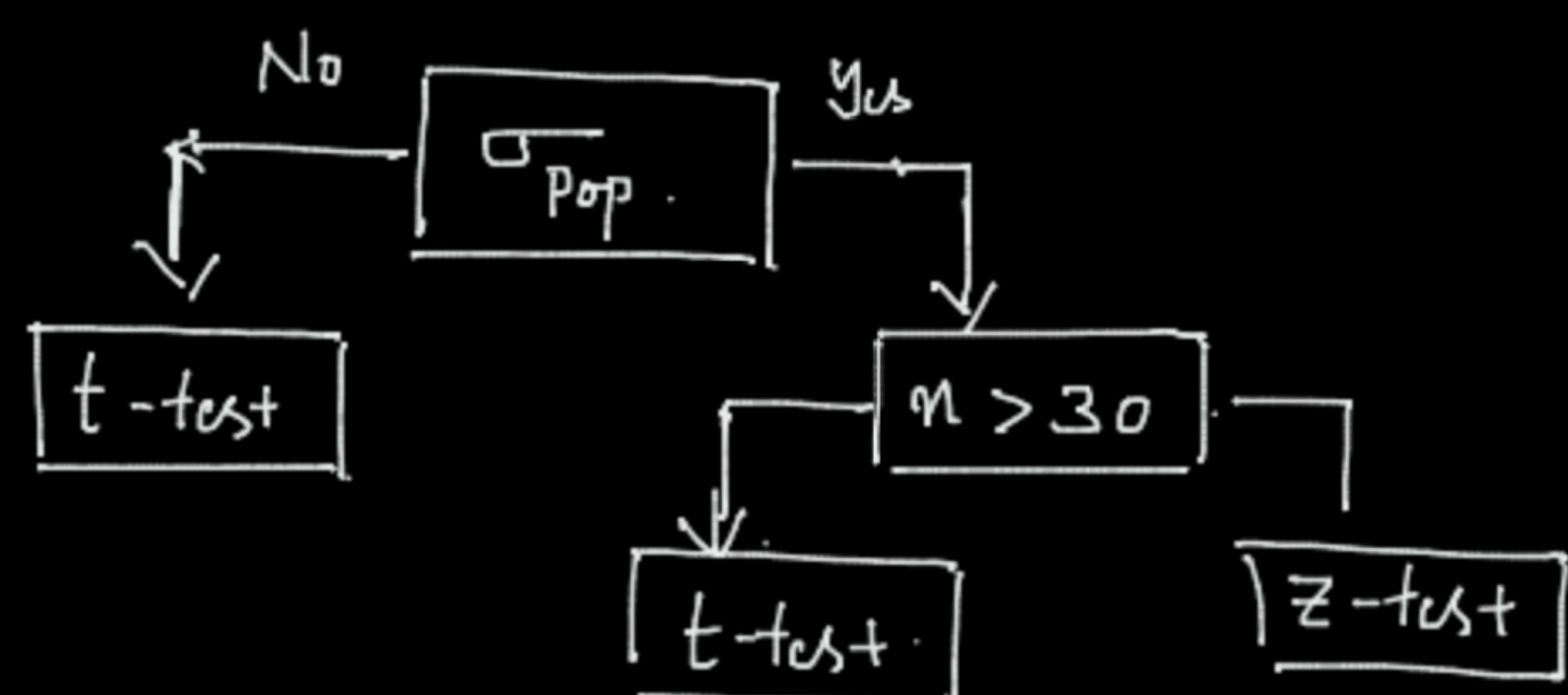
$p > \alpha \longrightarrow$ Fail to reject H_0.

← Types of hypothesis testing →

One sample test → z-test



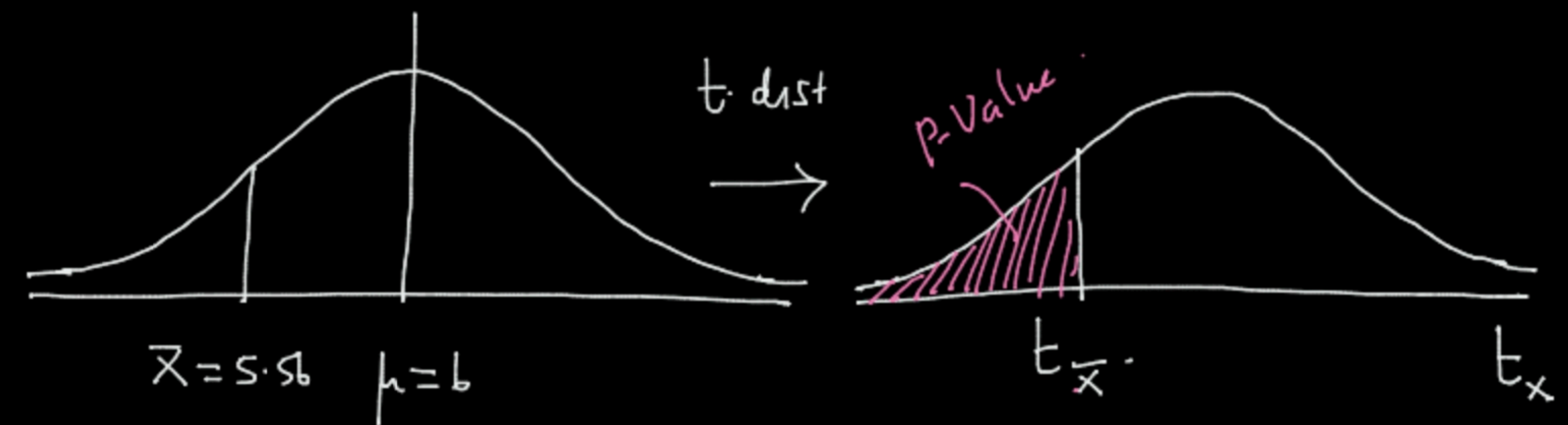
$$Z_{\bar{x}} = \frac{\bar{x} - \mu}{\sigma_{pop}/\sqrt{n}}$$



t-dist.

1. $n < 30$ ✓
2. σ_{pop} is not known

$n = 100$
$df = n - 1$



$$t_{\bar{x}} = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

Compare to Excel Avg

1. $\boxed{\mu = 78}$

$H_0: \mu \leq 78$

$H_a: \mu > 78$

$\alpha = 0.05$

S1 —
S2 —
S3 —
⋮
S10 —

$\bar{X} =$

Natural → $\boxed{60}$

$X =$

Two samples →

2

$H_a: \mu_1 > \mu_2$ $\quad \mu_1 < \mu_2$ $\quad \mu_1 \neq \mu_2$

Sample 1

$n_1 = 7$

S1
S2
S3
⋮
$\boxed{S7}$

$\bar{X}_1$

1
2
⋮
30

Sample

$n_2 = 7$

S8
S9
S10
⋮
$\boxed{S14}$

$\bar{X}_2 =$

1
2
⋮

2 . . .

$H_a: \mu_1 > \mu_2 \; ; \; \mu_1 - \mu_2 > 0.$

$\mu_1 < \mu_2 \; ; \; \mu_1 - \mu_2 < 0.$

$\mu_1 \neq \mu_2 \quad \mu_1 - \mu_2 \neq 0.$

Independent samples.

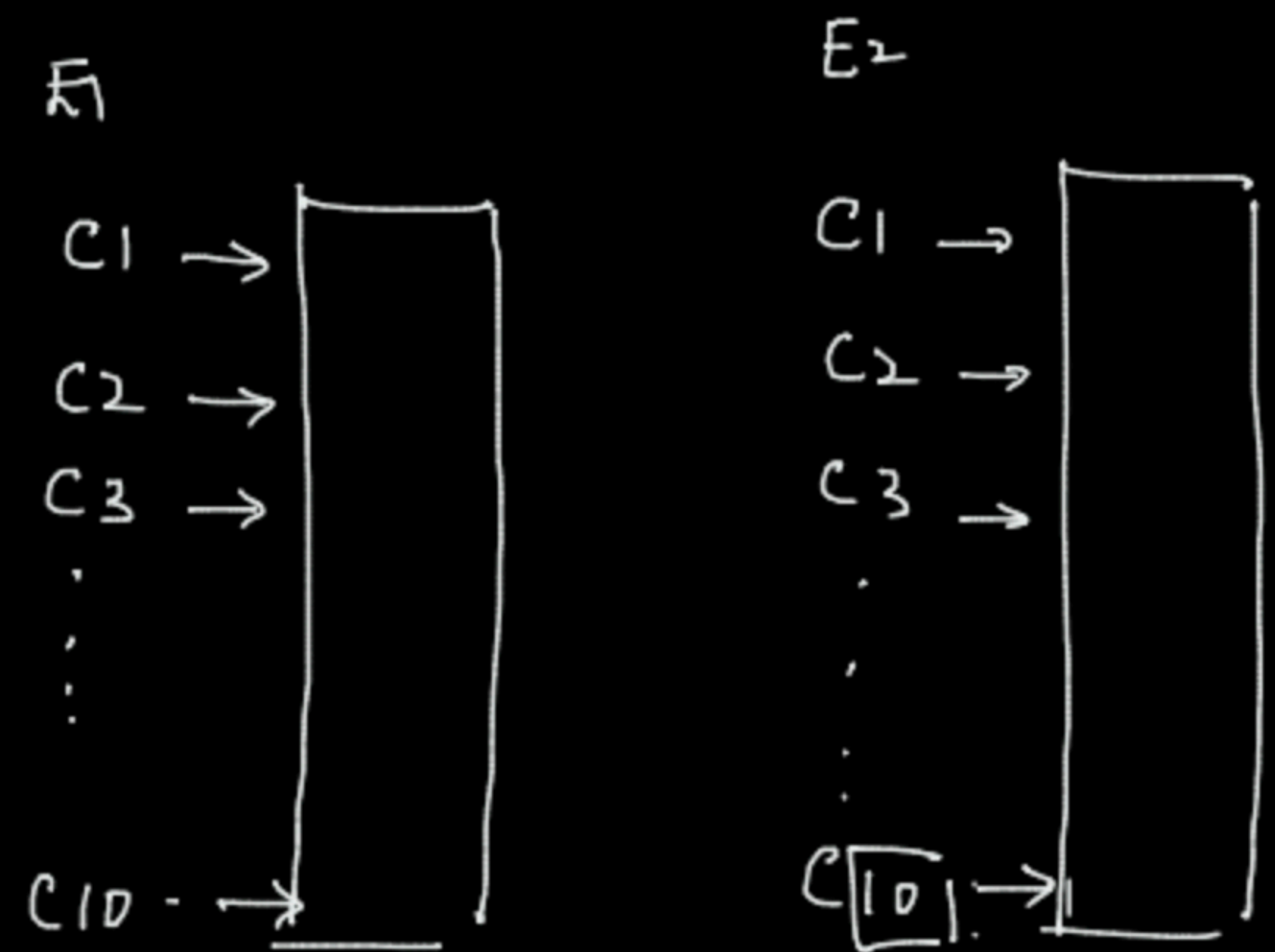
S_1	$\longleftrightarrow$	S_6
S_2	$\longleftrightarrow$	S_7
S_3		S_8
S_4		S_9
S_5		S_{10}

dep samples → pair wise Comparison

the class

S_1	$\longleftrightarrow$	S_1
S_2	$\longleftrightarrow$	S_2
S_3	$\longleftrightarrow$	S_3
S_4	$\longleftrightarrow$	S_4
S_5	$\longleftrightarrow$	S_5
Before Coaching		After Coaching
X_1		X_2

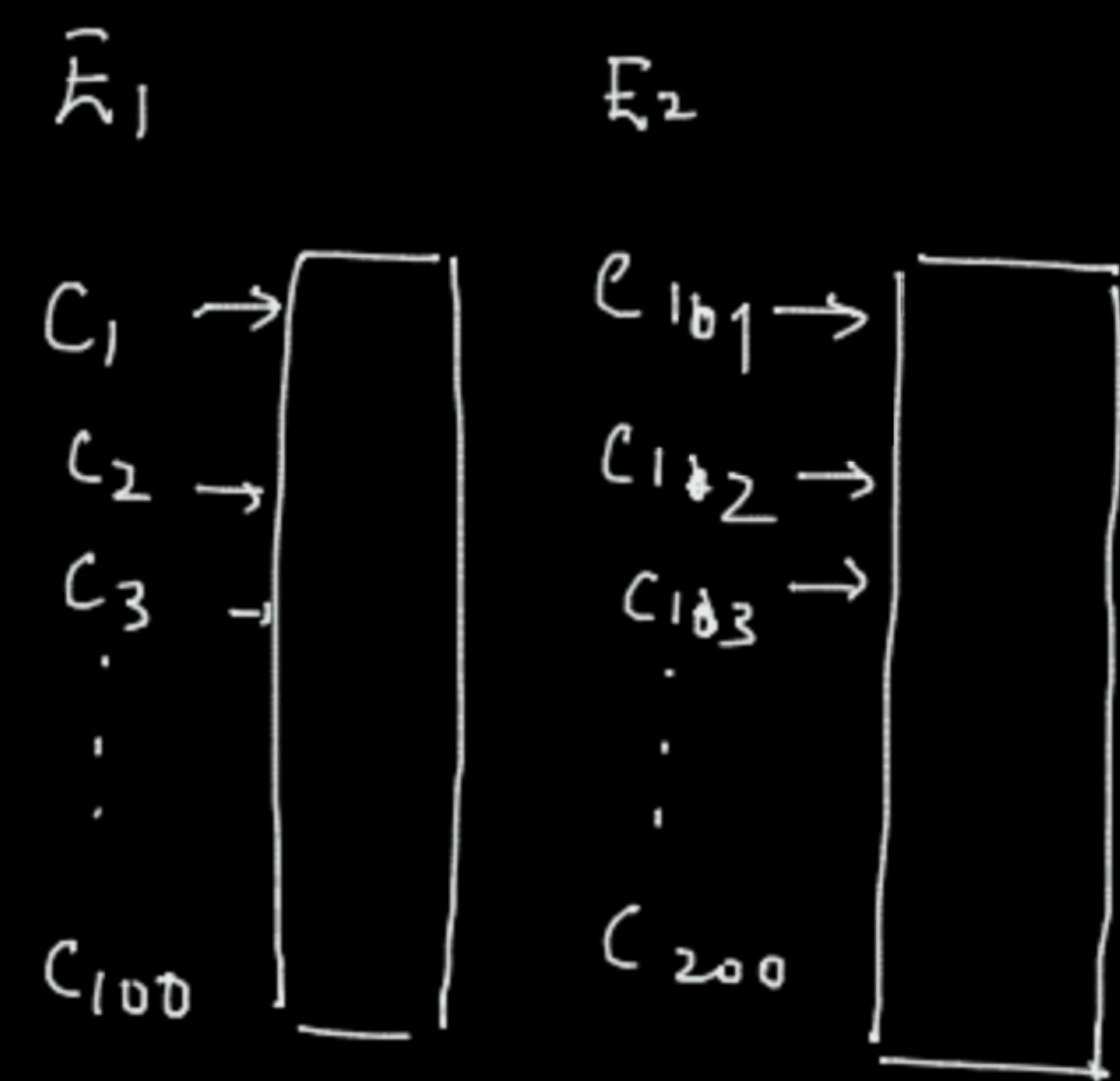
E_1 & E_2 → Compare their performance



Pairwise Comp.

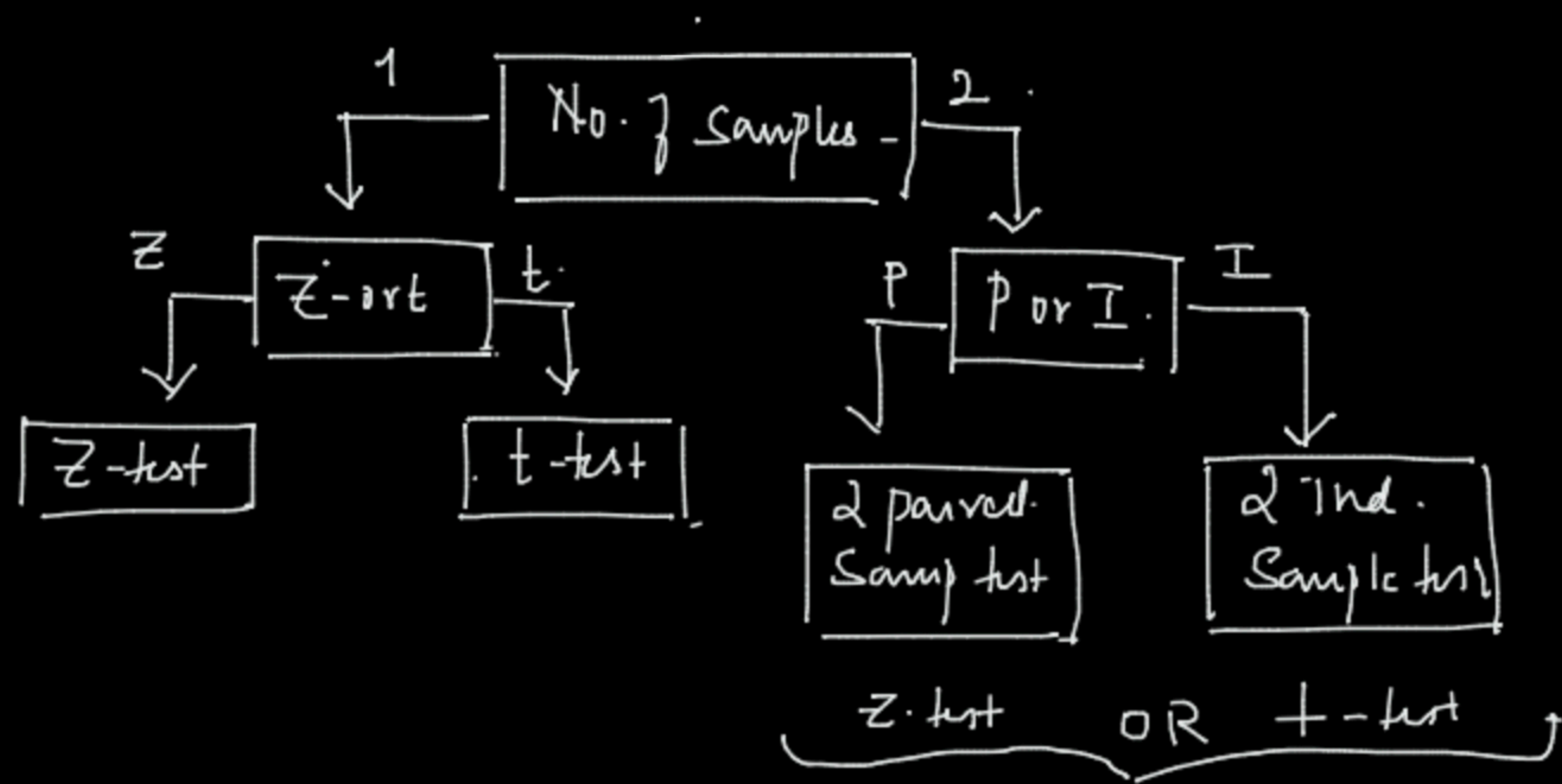
Two samples → dep. samp.

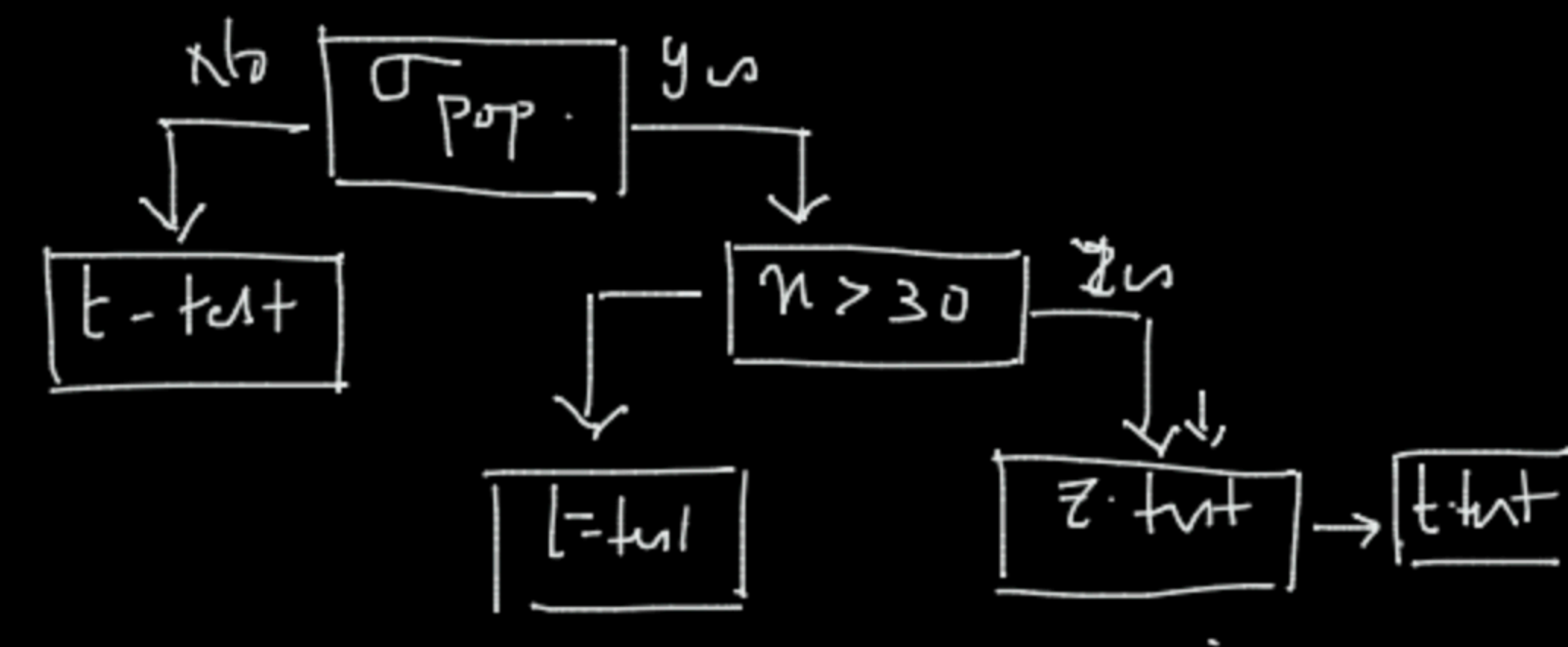
2 paired sample t-test



Two samples → indep sam

· 2 indep. Sample → t test.


No. of samples
1
2
Z
Z-or-t
t
Z-test
t-test
P
P or I
I
2 paired Samp test
2 Ind. Sample test
Z. test OR t-test


No
σ pop.
yes
t-test
n > 30
yes
t-test
Z. test
t test

10: 52 am