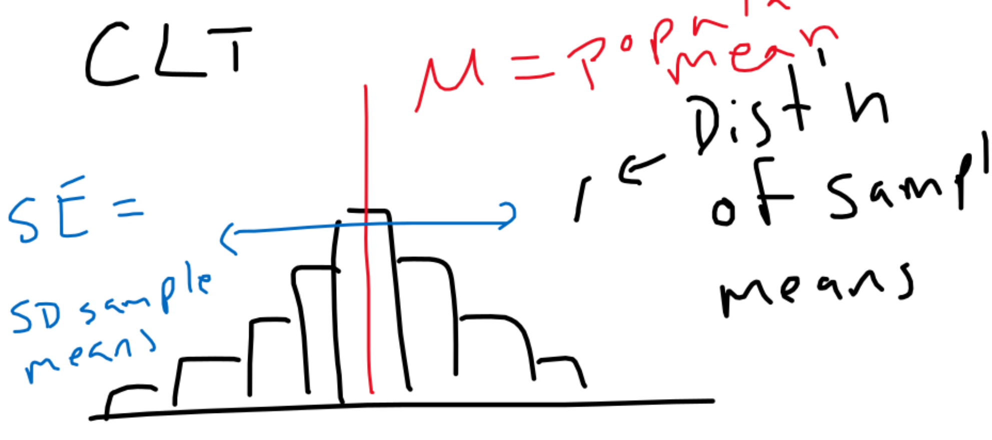
Meeting 9

CLT



EX: I tell you that I got a sample from a population with $\mu = 0$, and the sample mean, $\bar{Y}_1 = -3$ and $SE = 1.5$.

($SE = \frac{sd}{\sqrt{n}}$)

What can you tell me about my sample?

B, S, X

R, T

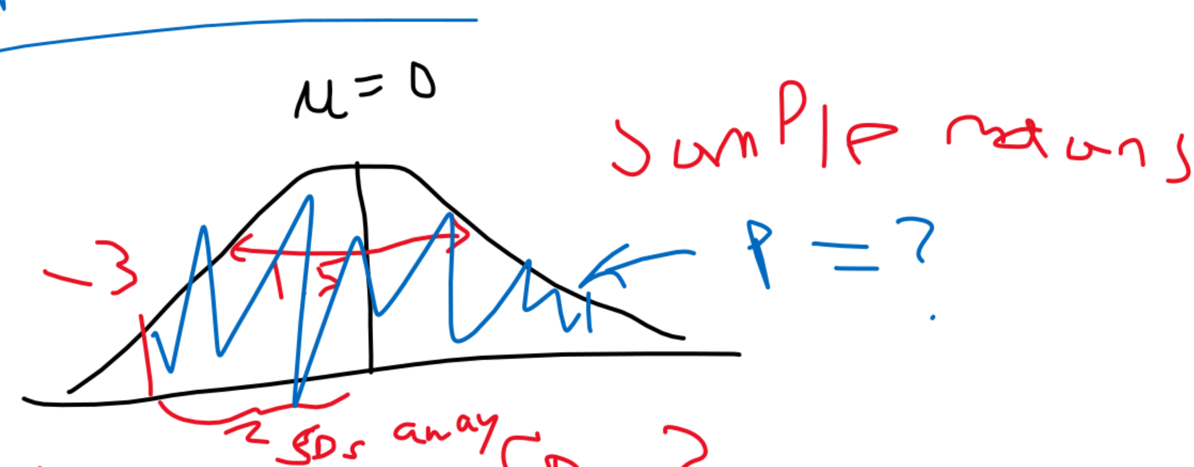
? SD is large

μ is a meas

N, Z

we were trying to define sd given standa

Matts answer



How many SDs?

About 95%

Is this working?

* * *

you are given a sample

- you calculate $\bar{Y}$, SE
- you know μ
- calculate a t-statistic

$$t_s = \frac{\bar{Y} - \mu}{S_{\bar{Y}}}$$

$\mu \sim \bar{Y}$

$S_{\bar{Y}} \sim SD$

$\bar{Y} \sim Y_i$

Hint $Z_i = \frac{Y_i - \bar{Y}}{SD}$

t stat = measure of how far your sample is from the mean.

Aside why t-dist'n?

→ because we are approximating the true population standard error

With what probability do you think we would classify a sample mean as being "extreme"?

Often see $p < 0.05$ } this is consensus

General steps of hypothesis testing

- Construct a Null hypothesis
  E.g. set our μ value, $\mu = 0$
- choose a test statistic that measures deviation from the Null
  E.g. t-statistic
- Calculate that stat and determine its prob
- If prob is very small (< 0.05) we reject our Null

Errors when hypothesis testing

Null hypothesis H_0

Alternative hypothesis H_A

TRUE	TEST RESULTS: Do not reject H_0	Reject H_0
H_0 True	✓	Type I (α)
H_0 False	Type II	✓

Type I = false conviction
false positives

Type II = false negatives

Reciprical of $\underbrace{\text{type II}}_{\beta}$ error is called Power

$$\text{power}(1-\beta) \propto \frac{ES\,\sqrt{n}\,\alpha}{\sigma}$$

Comparing two samples