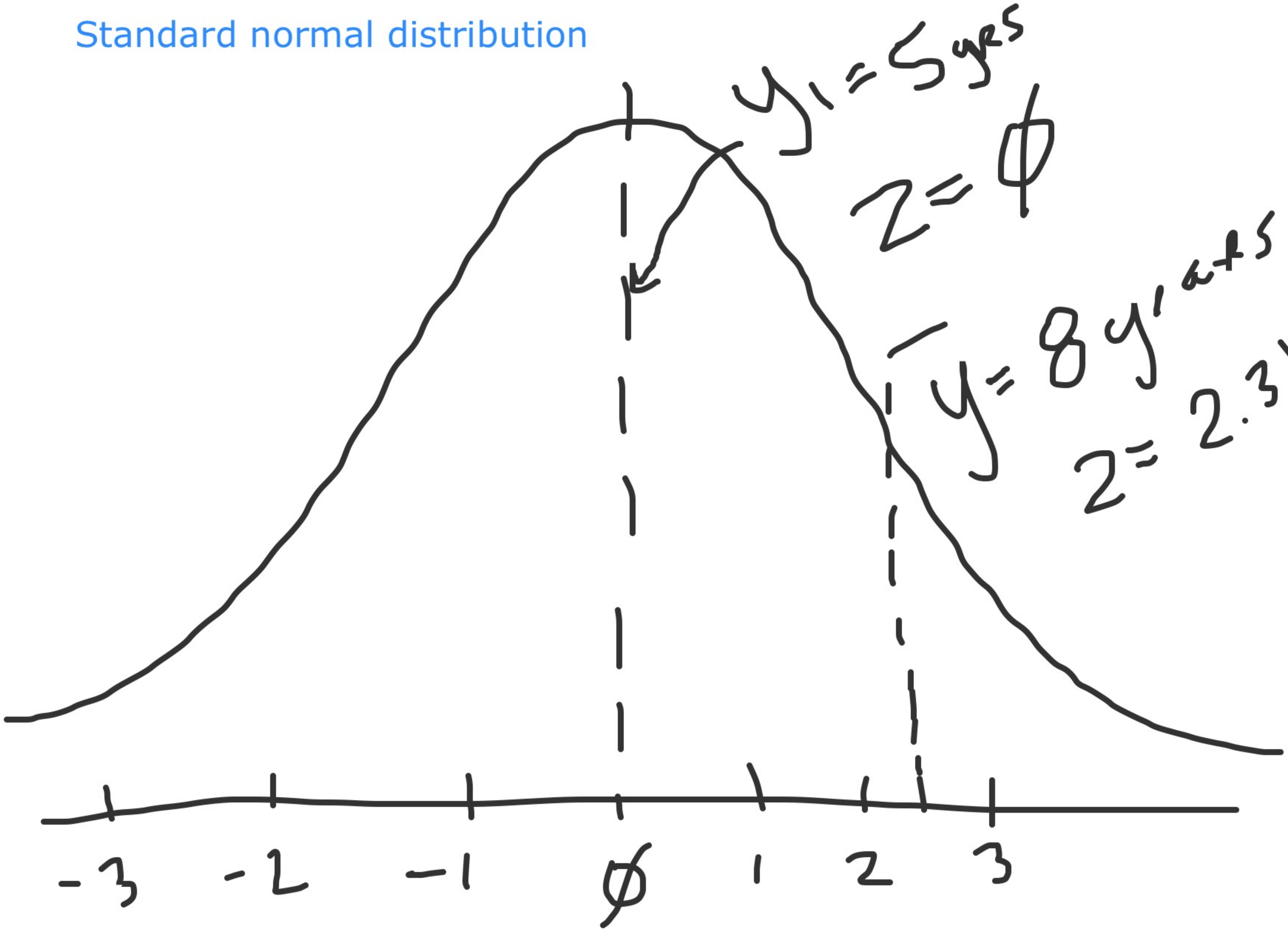
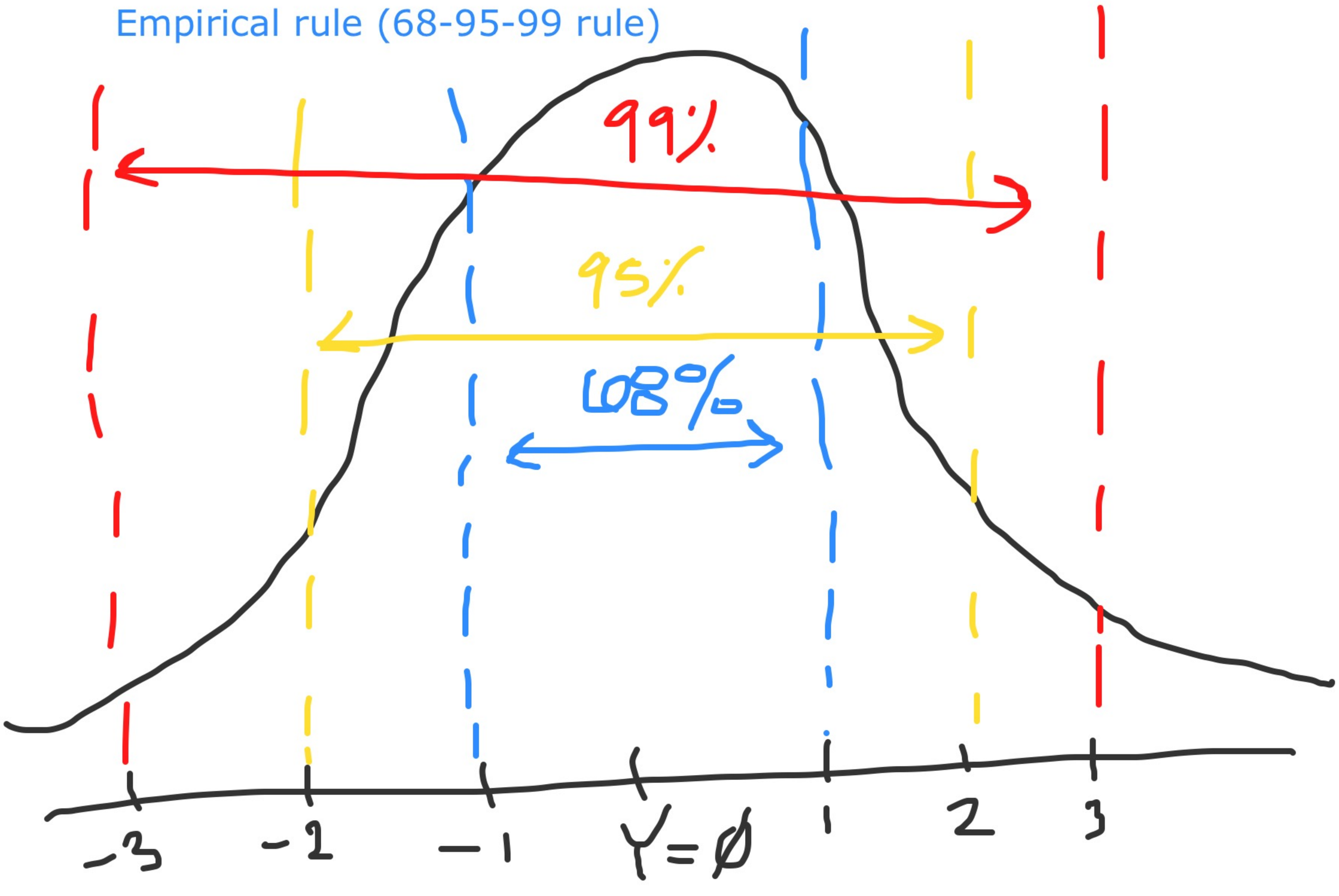
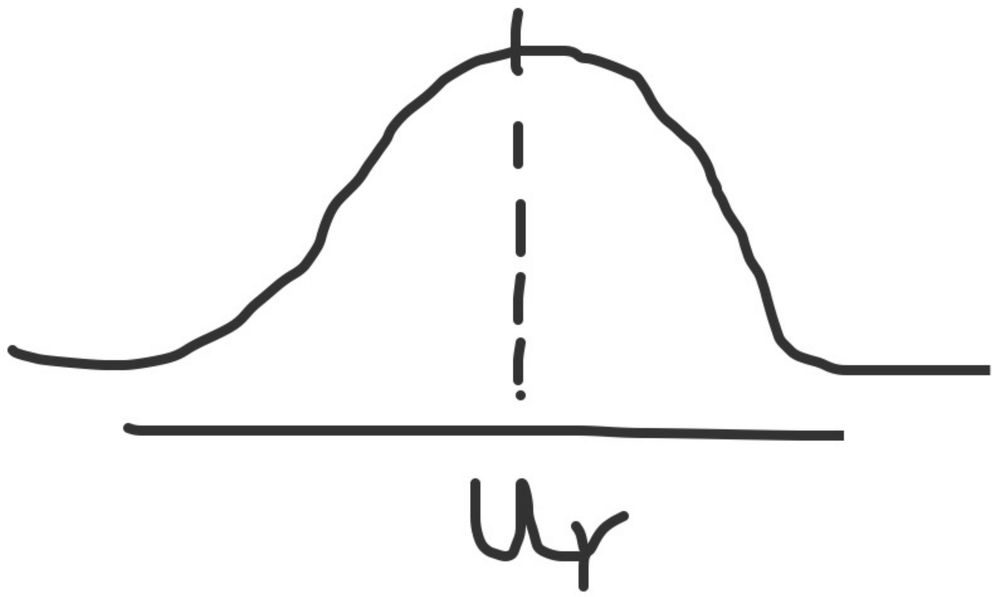
Standard normal distribution

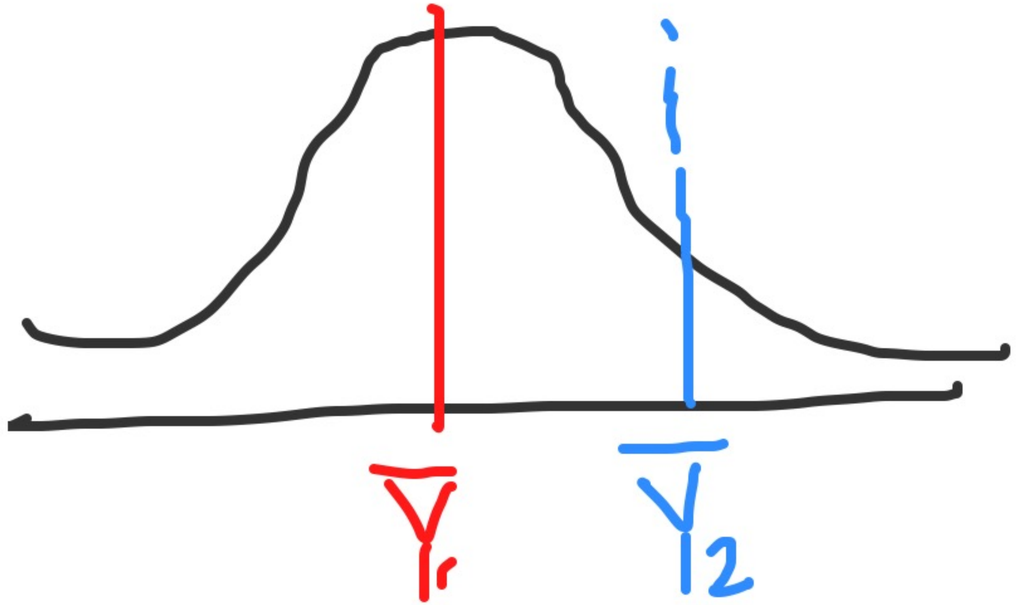


Empirical rule (68-95-99 rule)





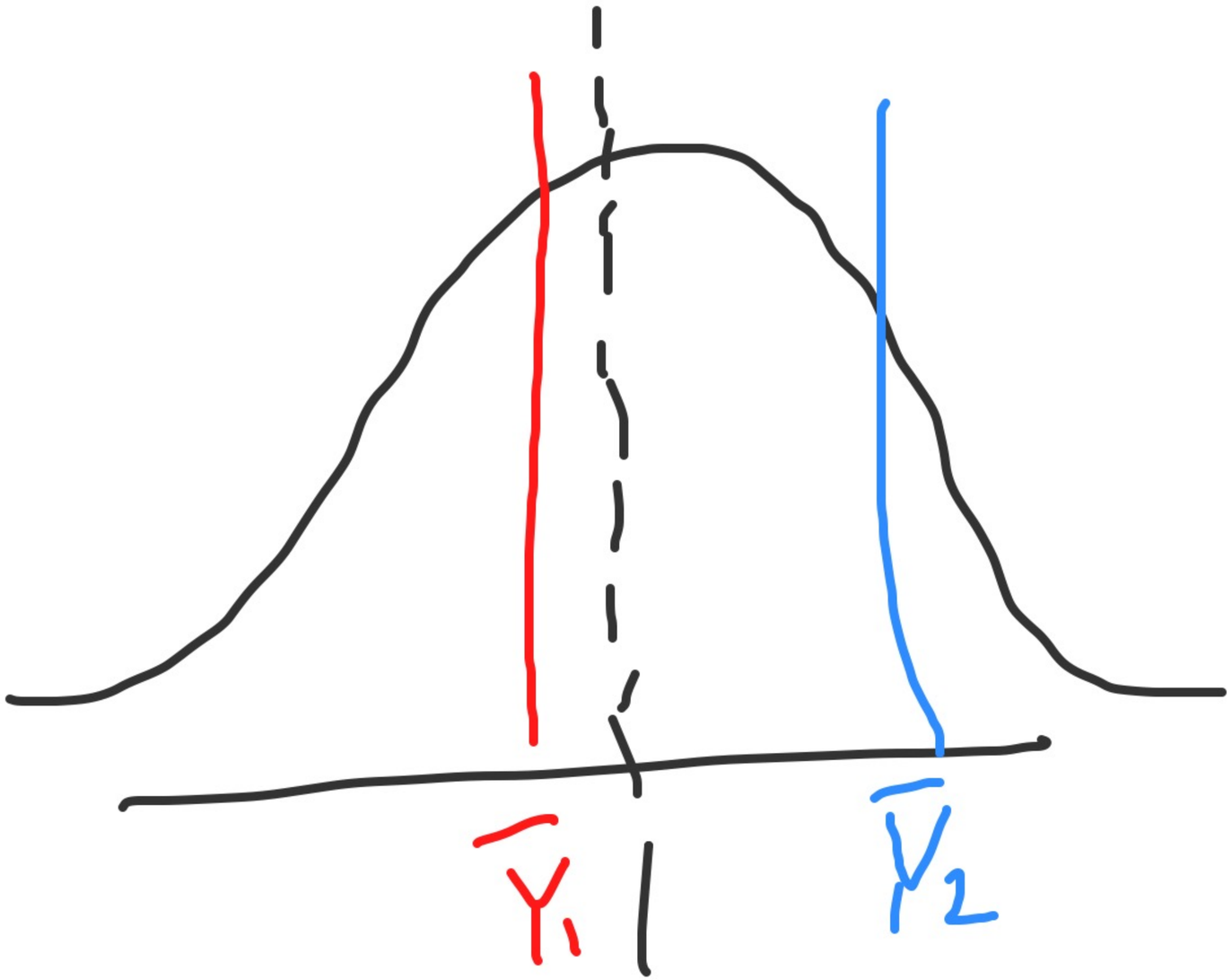
Population distribution



Sample distribution

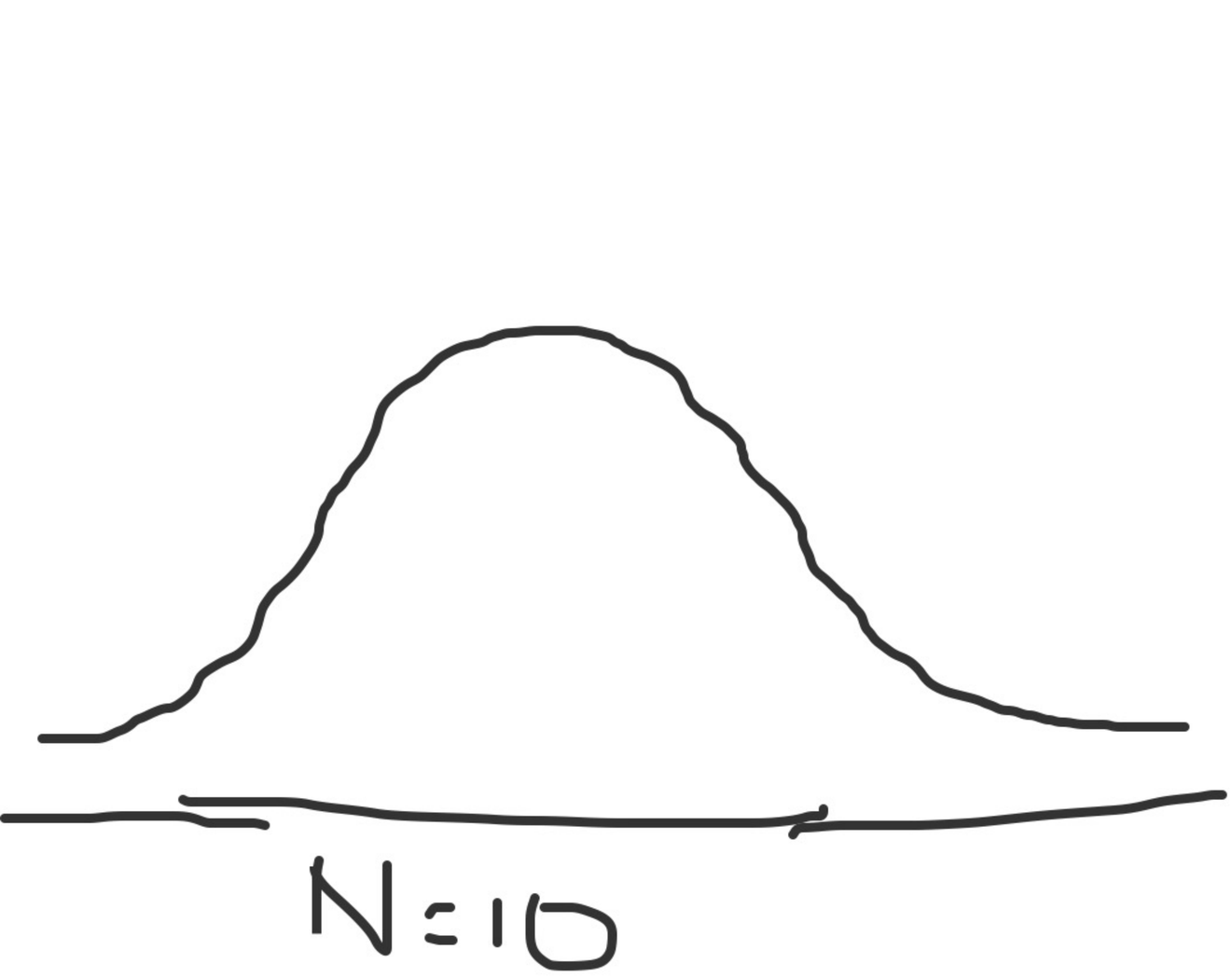
$\bar{Y}_1$ = n = 100

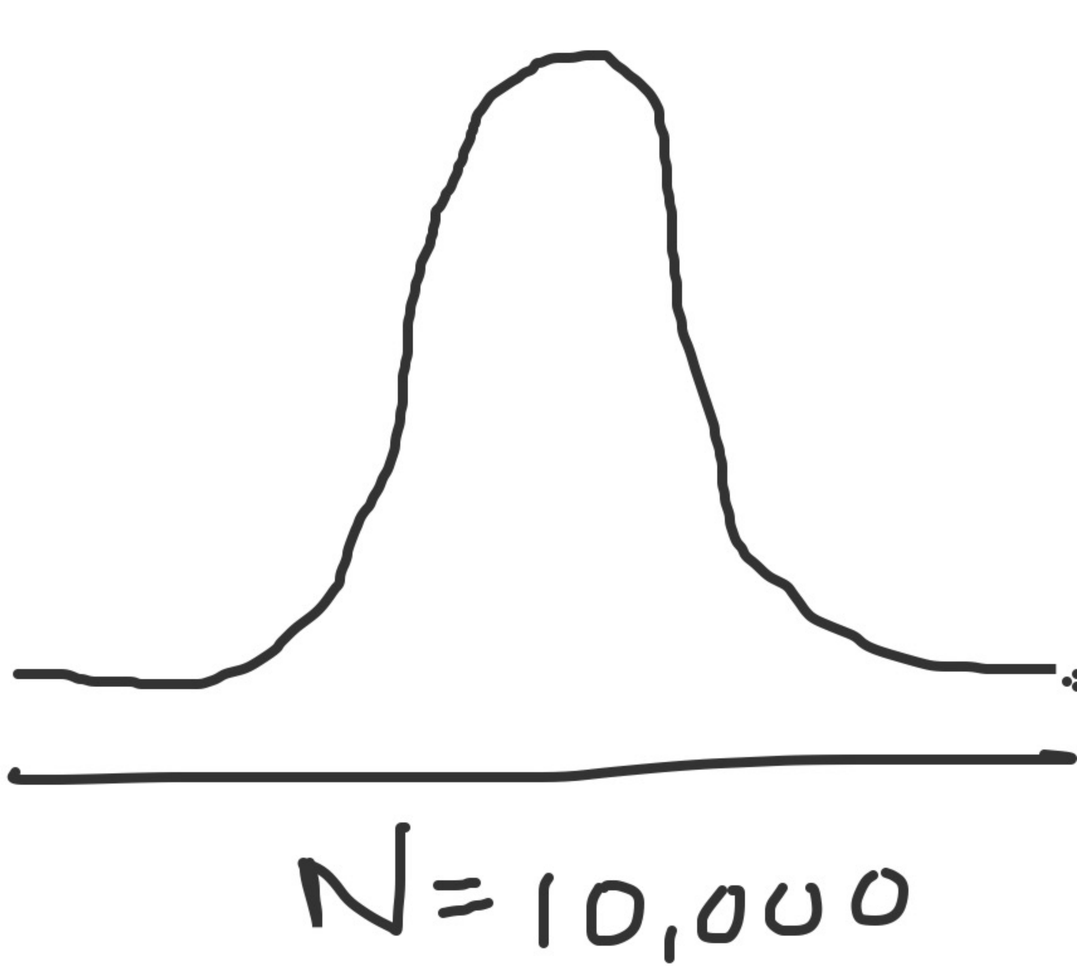
$\bar{Y}_2$ = n = 100



Sampling distribution

$\mu_{\bar{Y}} = \bar{\bar{Y}}$ mean of sample means

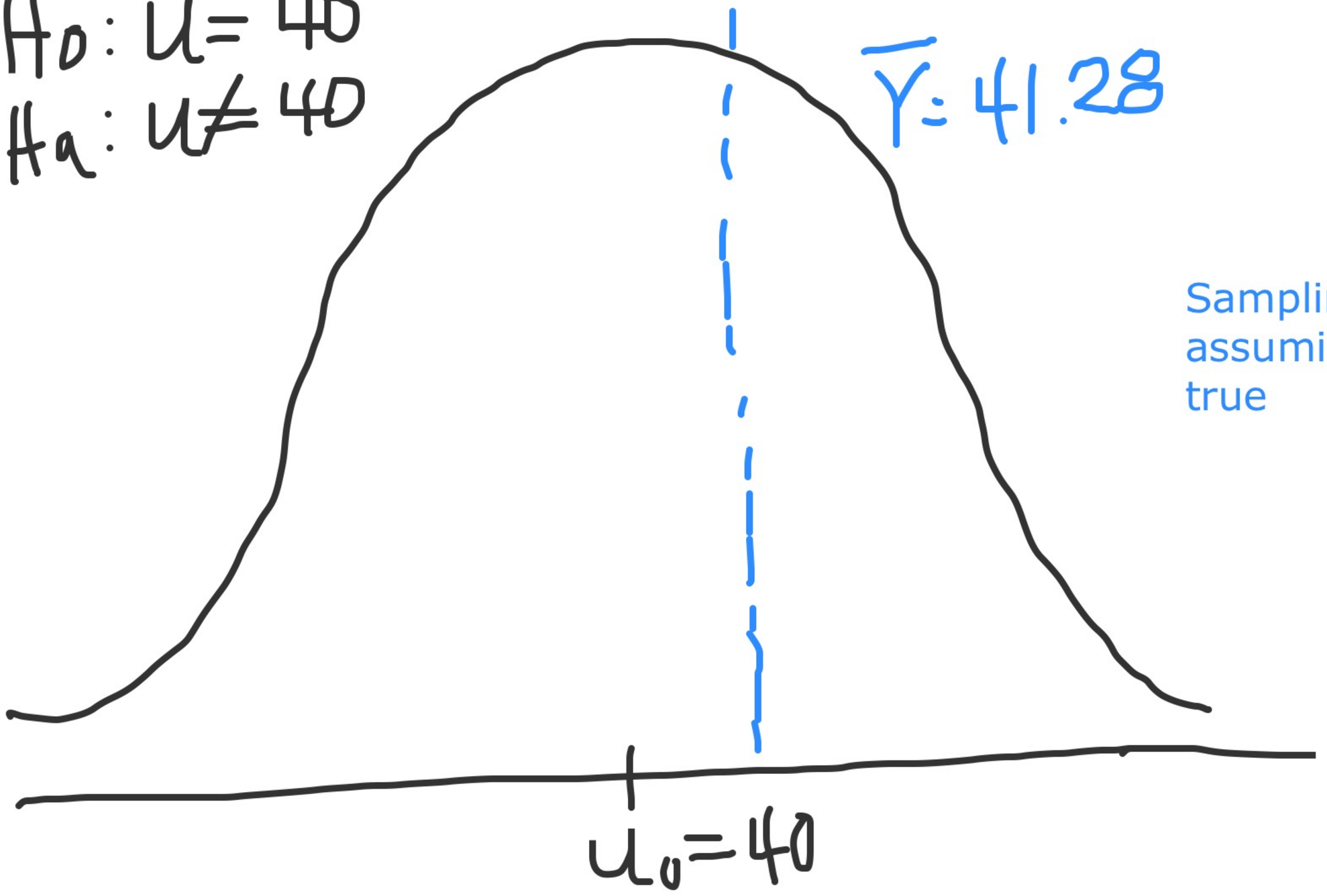

N=10


N=10,000

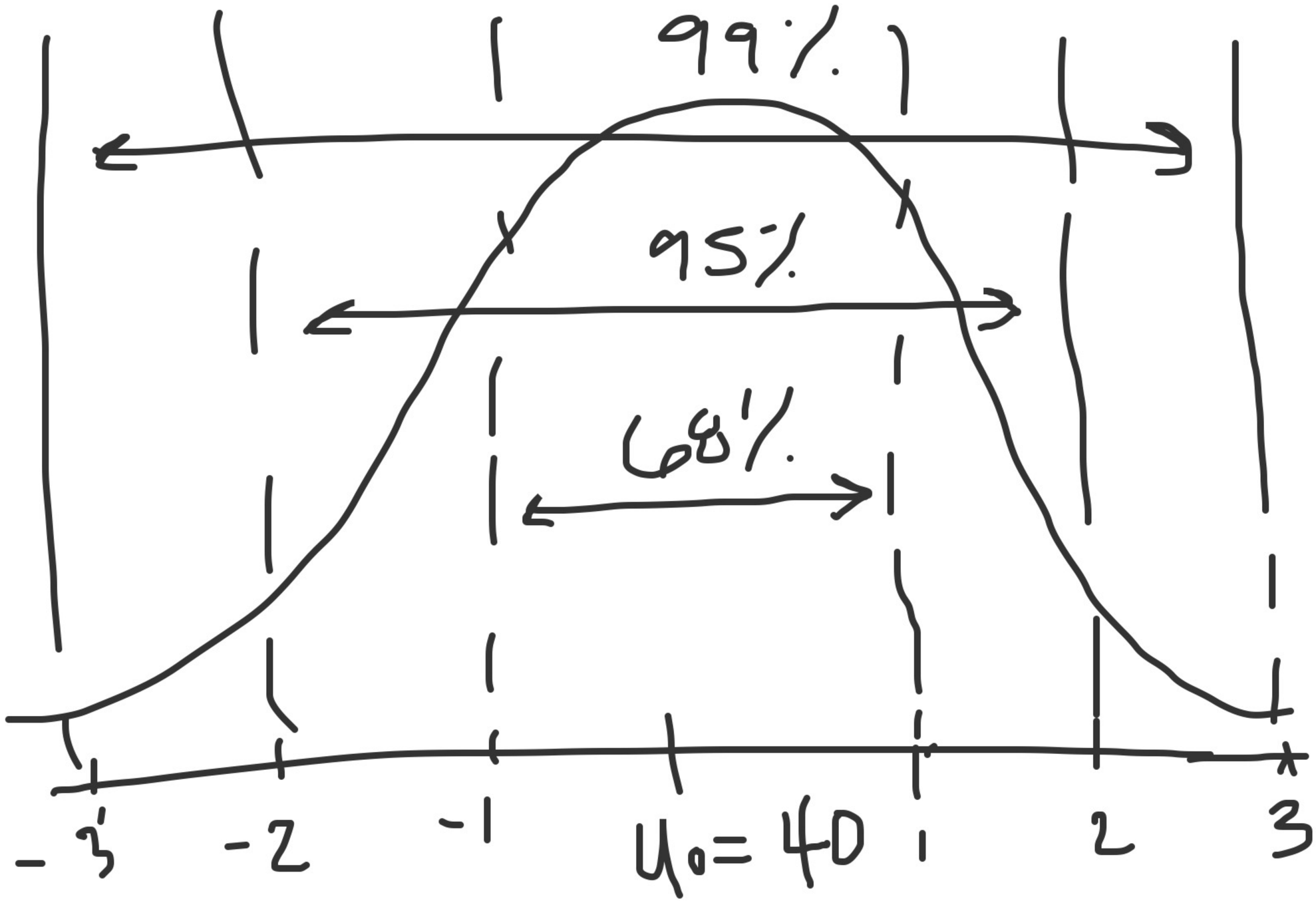
Step #2 hypothesis testing about population mean

$H_0: \mu = 40$

$H_a: \mu \neq 40$



Sampling distribution assuming the null is true


99%
95%
68%
-3
-2
-1
$\mu_0 = 40$
1
2
3

Step #4 p-value

$H_0: \mu = 40$

$H_a: \mu \neq 40$

$t = -3.29$

$Pr(t \leq -3.29)$

$p = 0.0005$

Sampling distribution assuming null is true

$\bar{Y} = 41.28$

$t = 3.29$

$p = 0.001$

p-value

-3 -2 -1 $\mu_0 = 40$ 1 2 3

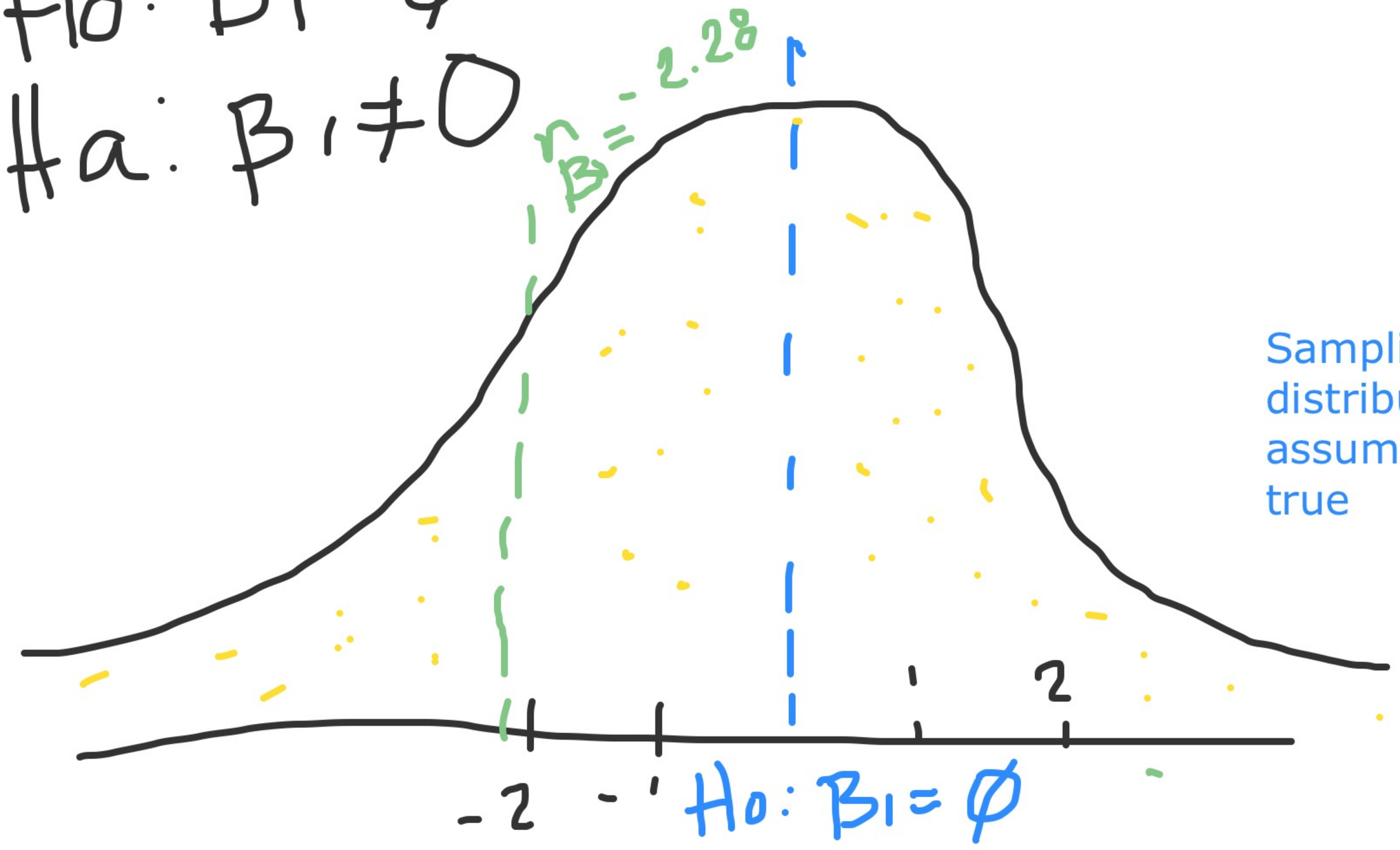
$P_v(t \geq 3.29)$

$= 0.0005$

Using Beta1-hat to test hypothesis about Beta1

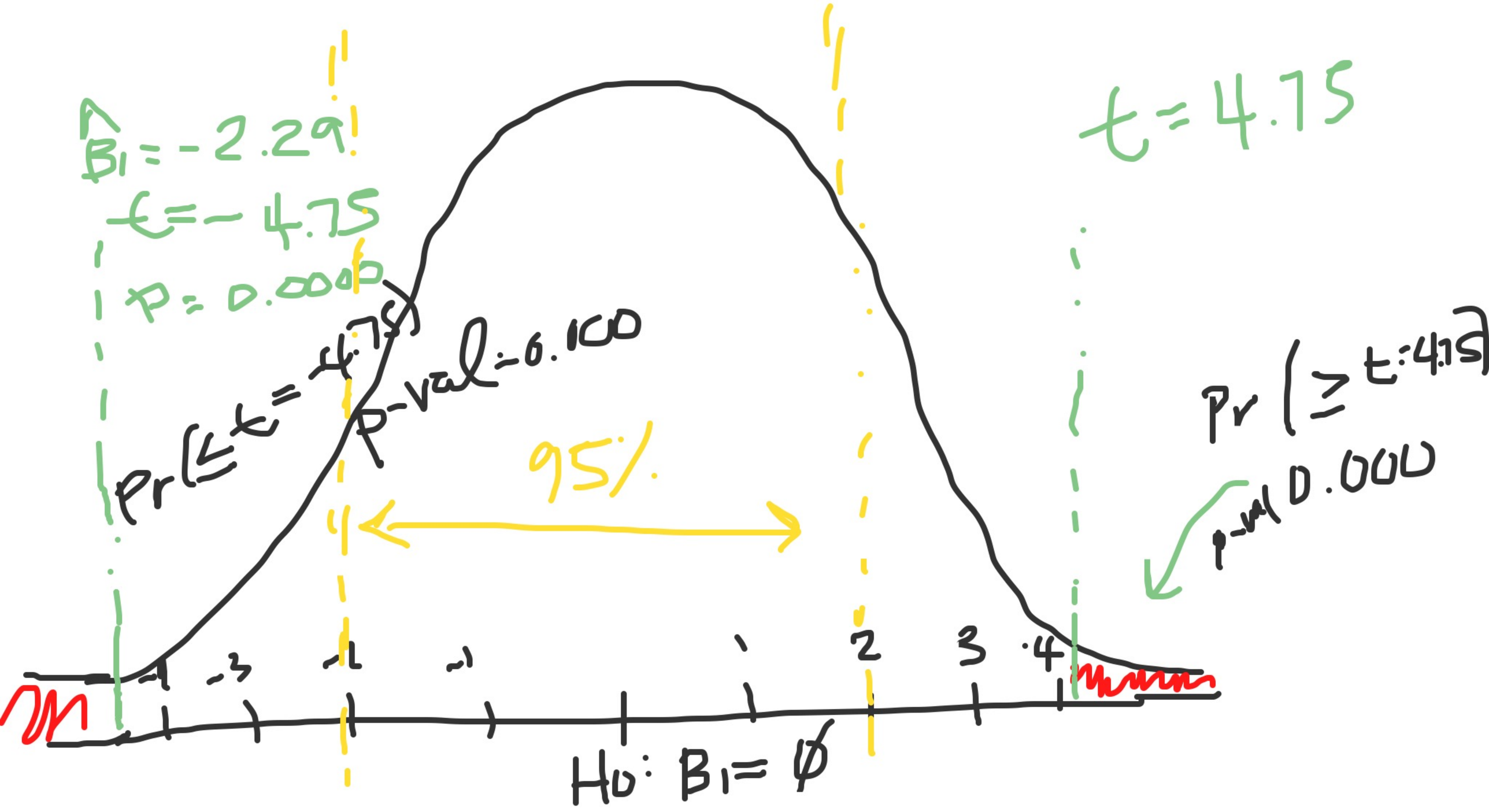
$H_0: \beta_1 = \phi$

$H_a: \beta_1 \neq 0$



Sampling distribution assuming null is true

Convert to standard normal distribution



Student exercise

X = exp-per-stu

Y = student score

1. $H_0: \beta_1 = \emptyset$

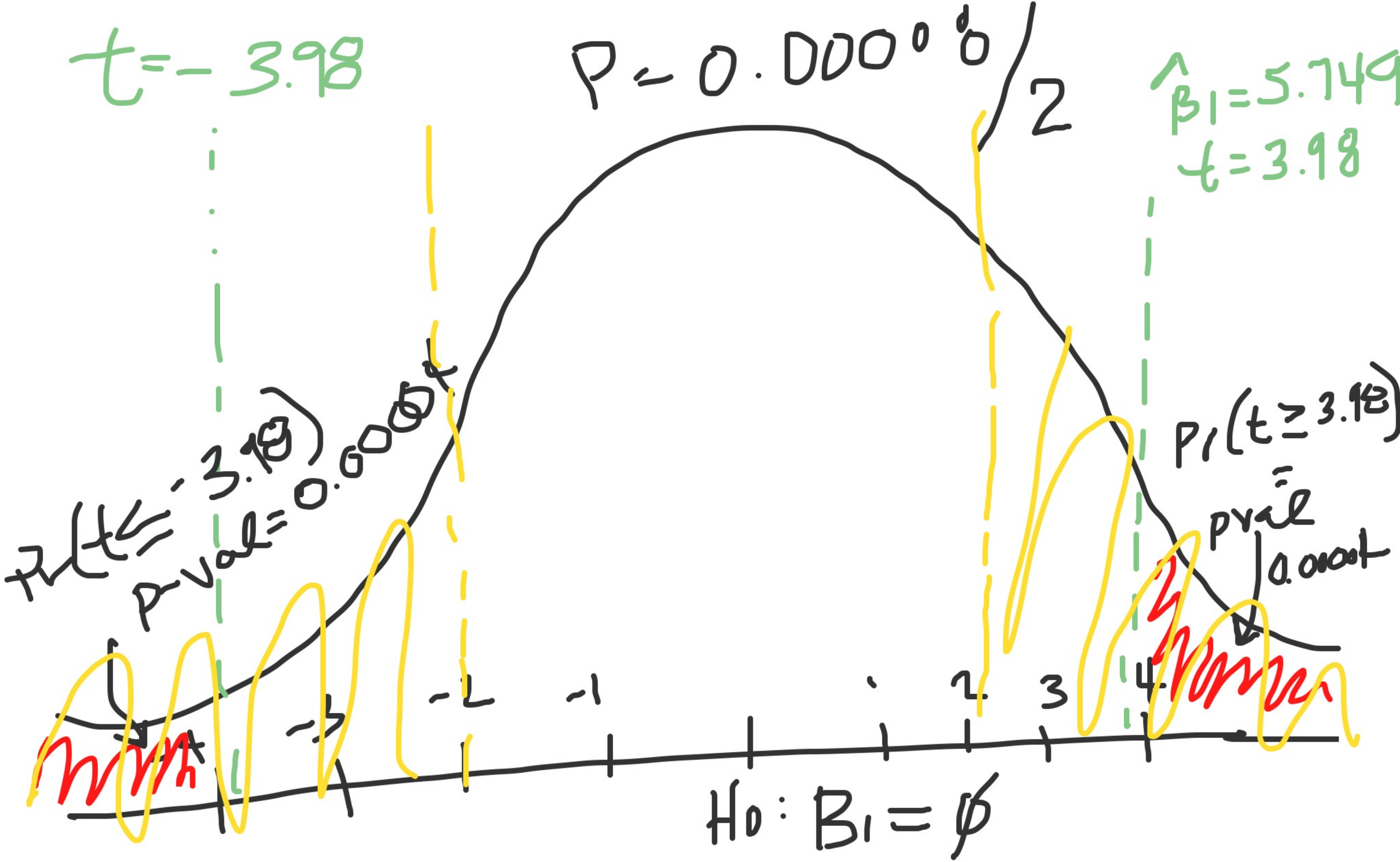
   $H_a: \beta_1 \neq 0$

$\hat{\beta}_1 = 5.749$

$SE(\hat{\beta}_1) = 1.443$

3. $t = \dfrac{\hat{\beta}_1 - \beta_{1,\emptyset}}{SE(\hat{\beta}_1)}$

$\dfrac{5.749 - \emptyset}{1.443} = 3.984061$


t=-3.98
P=0.00006/2
β1=5.749
t=3.98
P(t≤-3.98)=0.00006
pval=0.00006
P(t≥3.98)=
pval
0.00006
-3
-2
-1
2
3
4
H0: B1 = ϕ

$t = -3.98$

$P = 0.0000 / 2$

$\hat{\beta}_1 = 5.749$

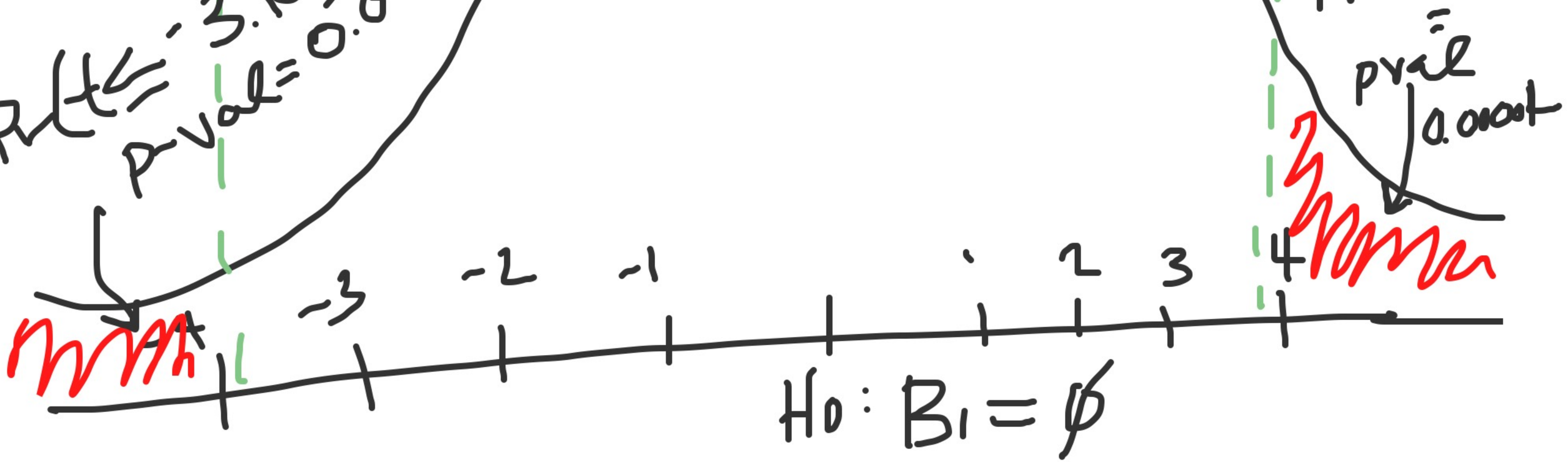
$t = 3.98$

$P(t \leq -3.98) = 0.0001$

pval $= 0.0$

$P(t \geq 3.98) =$

pval $= 0.0001$



$H_0 : \beta_1 = \phi$