Ch.: 4 (Inference)

$\beta \rightarrow$ unknown

test using $\hat{\beta}$

3 ways

- is $\hat{\beta}$ far away from hyp. value of β
- how improbable is $\hat{\beta}$
- is hyp. β in $\hat{\beta} - E$, $\hat{\beta} + E$

E ↓ margin of error

Sampling Distribution

$\hat{\beta}_j = \beta_j +$ a term linear in u

↓

its distribution follows from that of u

Ass^n : $u \longrightarrow$ indep. of $x_1 \ldots x_k$

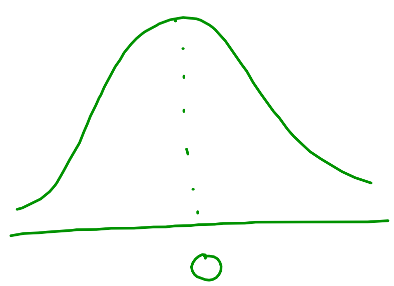
↳ normal

$$u \sim N(0, \sigma^2)$$

is distributed as

$E(u) = 0$

$var(u) = \sigma^2$



$$\hat{\beta}_j \sim N(\beta_j, var(\hat{\beta}_j))$$

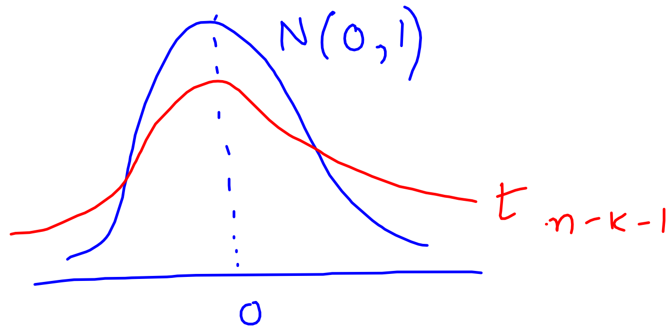
↳ from Ch. 3

$$\frac{\hat{\beta}_j - \beta_j}{sd(\hat{\beta}_j)} \sim N(0,1)$$

$$\frac{\hat{\beta}_j - \beta_j}{se(\hat{\beta}_j)} \sim t_{n-k-1} \quad (t \text{ dist. with } df = n-k-1)$$

using $\hat{\sigma}$ instead of σ

$\rightarrow N(0,1)$ as $df \rightarrow \infty$



Single hyp. – single parameter

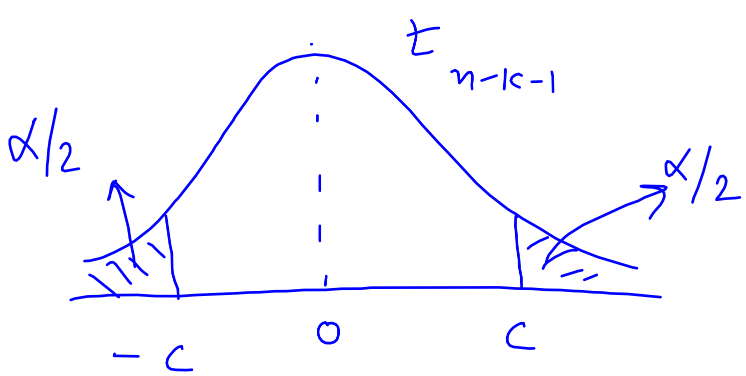
Null : $H_0 : \beta_j = a_j$ $a_j = 0 \rightarrow$ special case

Alternative : $H_1 : \beta_j \neq a_j$

$\rightarrow$ can have $>$, $<$

Test statistic ("t" ratio)

$$t_{test} = \frac{\hat{\beta}_j - a_j}{se(\hat{\beta}_j)}$$



area $= \alpha$

$\alpha = P(\text{rej. } H_0 \mid H_0 \text{ true})$

$= \text{sig. level (size)}$

$= P(\text{Type I error})$

Reject H_0 if $|t_{test}| > c$

else fail to reject.