Single hypothesis – single parameter

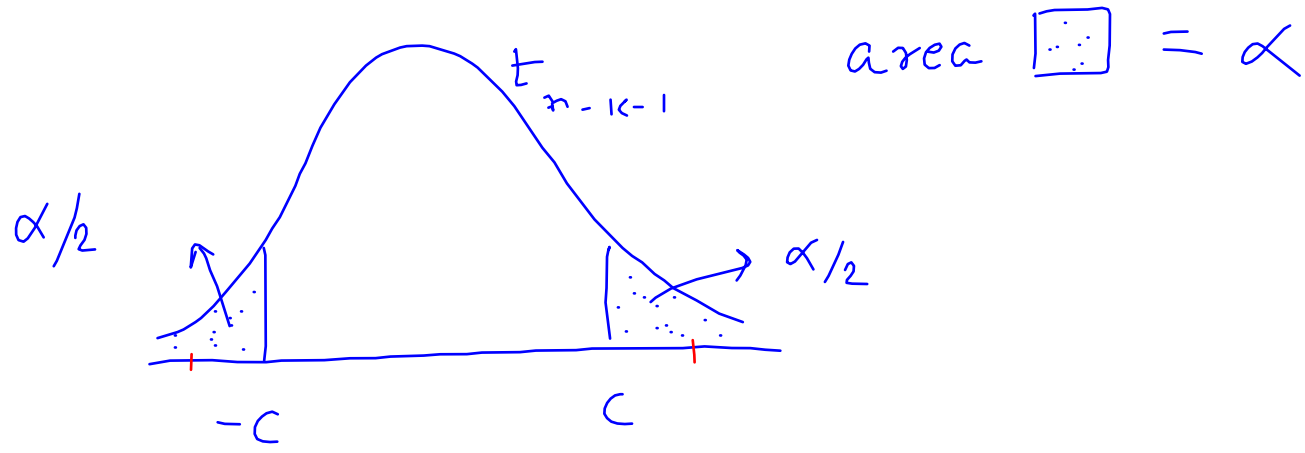
Null $H_0 : \beta_j = a_j$ $\quad a_j = 0 \rightarrow$ special case

Alternative $H_1 : \beta_j \neq a_j \rightarrow$ two-tailed test

$>$ or $<$: one-tailed test

Test statistic, or
t "
t ratio

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



If H_0 is true, unlikely that $|t_{test}| > c$

Rejectim rule : reject H_0 if $|t_{test}| > c$ else fail to reject H_0.

α = significance level (or size)

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

Equivalent decision rule: reject H_0 if a_j is beyond $c \cdot se(\hat{\beta}_j)$ from $\hat{\beta}_j$.

Fail to reject H_0 if a_j is within

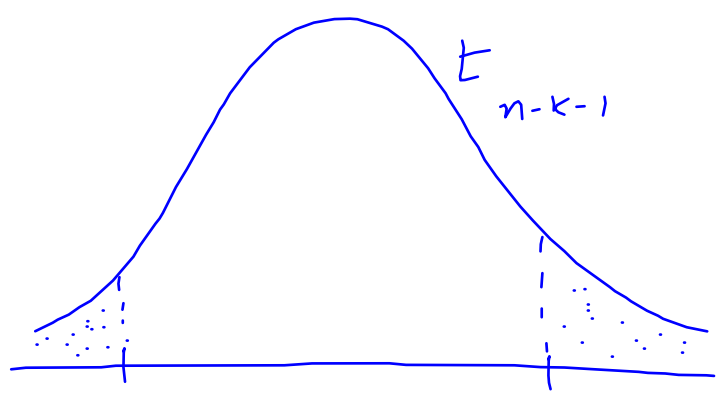
$$\left[\hat{\beta}_j - c \cdot se(\hat{\beta}_j) \, , \, \hat{\beta}_j + c \cdot se(\hat{\beta}_j) \right]$$

$(1-\alpha)$ confidence interval for β_j : $\hat{\beta}_j \pm c \cdot se(\hat{\beta}_j)$

↓

confidence level $= P(\text{not rej. } H_0 \mid H_0 \text{ true})$

Another equivalent rejectim rule : reject H_0 if area beyond $|t_{test}|$ and $-|t_{test}|$.



$< \alpha$.

$-|t_{test}|$ $\qquad$ $|t_{test}|$ $\qquad$ area $\boxed{\cdot\cdot}$ $= 2\,P(t > |t_{test}|)$

p-value

Rej. H_0 if p-value $< \alpha$.

NBASAL

$$wage = \beta_0 + \beta_1 points + \beta_2 rebounds + \beta_3 assists + u$$

$$H_0 : \beta_1 = 0$$

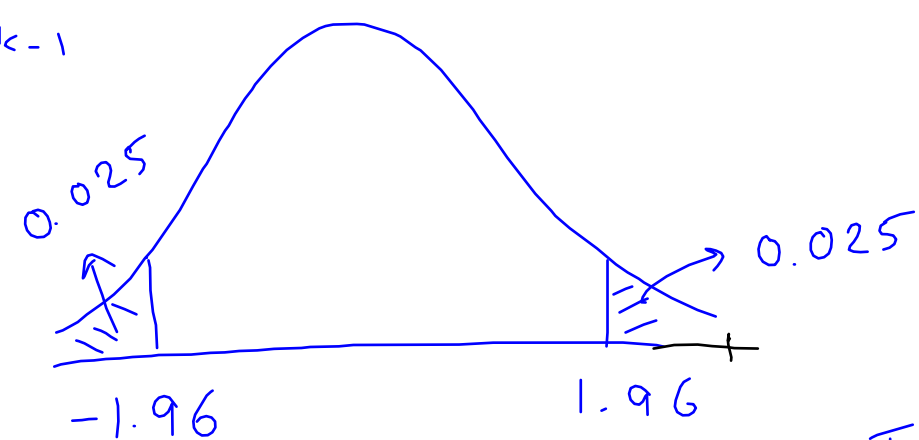
$$H_1 : \beta_1 \neq 0$$

$$t_{test} = \frac{\hat{\beta}_1}{se(\hat{\beta}_1)} = 7.02 = \frac{81.19}{11.569}$$

c for t_{n-k-1}

$\alpha = 0.05$

$c = 1.96$



$n - k - 1$

$= 269 - 3 - 1$

$= 265$

Table G.2 : t

Table G.1 : N(0,1) or Z

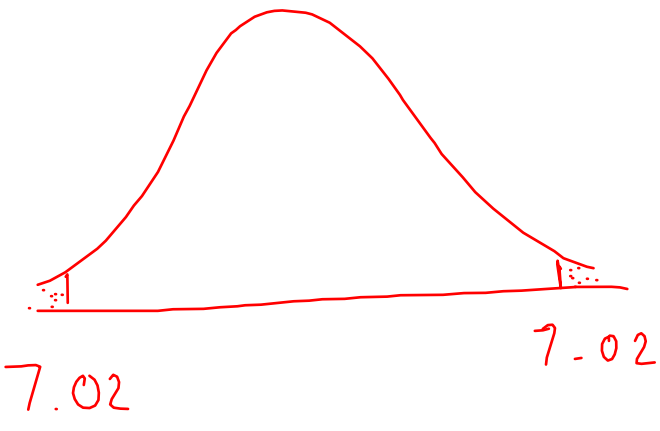
Rej. H_0 : $t_{test} > 1.96$

0.95 CI : $\hat{\beta}_1 \pm c \cdot se(\hat{\beta}_1)$

81.19 ; 1.96 ; 11.569

$[58.41, 103.97]$

Rej. H_0 : CI excludes 0.



p-value practically zero.

Rej. H_0 : p-value < 0.05.

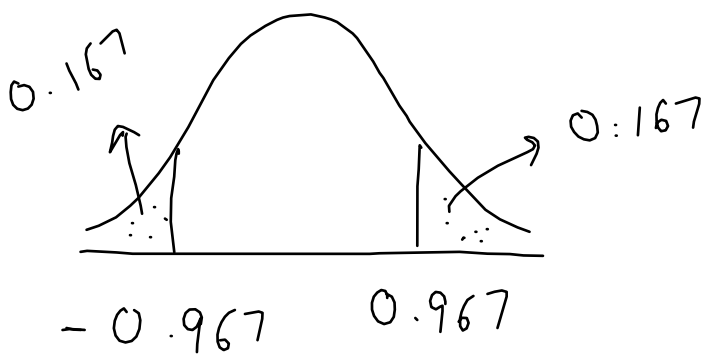
$H_0 : \beta_1 = 70$

$H_1 : \beta_1 \neq 70$

$$t_{test} = \frac{\hat{\beta}_1 - 70}{se(\hat{\beta}_1)} = 0.967$$

$|t_{test}| < 1.96$

Fail to rej. H_0 ⟶ 70 is in CI



⟶ p-value > 0.05

$= 2 \times 0.167$

$= 0.334$