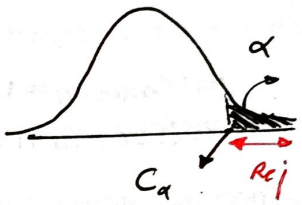
Hypothesis testing

① $H_0: \beta_j \leq 0$

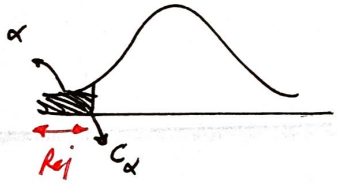
$H_1: \beta_j > 0$ one-sided test (right tail)



$$t = \frac{\hat{\beta}_j - 0}{se(\hat{\beta}_j)}$$

② $H_0: \beta_j \geq 0$

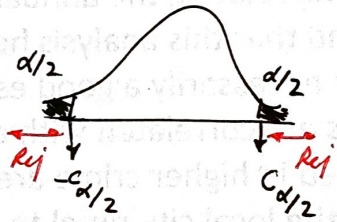
$H_1: \beta_j < 0$ one-sided test (left tail)



$$t = \frac{\hat{\beta}_j - 0}{se(\hat{\beta}_j)}$$

③ $H_0: \beta_j = 0$

$H_1: \beta_j \neq 0$ Two-sided test



$$t = \frac{\hat{\beta}_j - 0}{se(\hat{\beta}_j)}$$

④ $H_0: \beta_j = a_j$

$H_1: \beta_j \neq a_j$

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

⑤ linear Combination of β_j → θ trick

example: $H_0: \beta_1 = \beta_2$ or $\beta_1 - \beta_2 = 0$

$H_1: \beta_1 - \beta_2 \neq 0$ or

$\beta_1 - \beta_2 < 0$ or

$\beta_1 - \beta_2 > 0$

rewriting the model with

$\theta = \beta_1 - \beta_2$

or $\beta_2 = \theta + \beta_1$

⑥ Overall significance — F-test

$H_0: \beta_1 = \beta_2 = \dots \beta_k = 0$

$H_1:$ at least one $\neq 0$