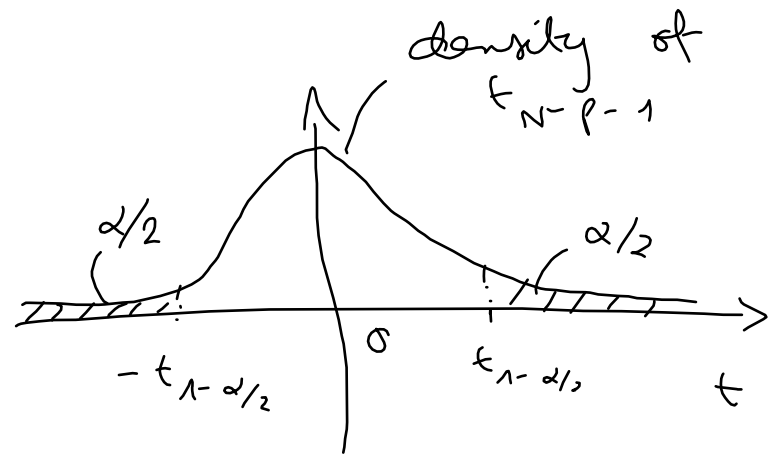


We have

$$T = \frac{\hat{\beta}_j - \beta_j}{\hat{\sigma} \sqrt{V_j}} \sim t_{N-p-1}$$



$$P\left(-t_{1-\alpha/2} \leq \frac{\hat{\beta}_j - \beta_j}{\hat{\sigma} \sqrt{V_j}} \leq t_{1-\alpha/2}\right) = 1 - \alpha$$

$$\rightarrow P\left(-t_{1-\alpha/2} \cdot \hat{\sigma} \sqrt{V_j} \leq \hat{\beta}_j - \beta_j \leq t_{1-\alpha/2} \hat{\sigma} \sqrt{V_j}\right) = 1 - \alpha$$

$$\rightarrow P\left(-\hat{\beta}_j - t_{1-\alpha/2} \hat{\sigma} \sqrt{V_j} \leq -\beta_j \leq -\hat{\beta}_j + t_{1-\alpha/2} \hat{\sigma} \sqrt{V_j}\right) = 1 - \alpha$$

$$\rightarrow P\left(\hat{\beta}_j + t_{1-\alpha/2} \hat{\sigma} \sqrt{V_j} \geq \beta_j \geq \hat{\beta}_j - t_{1-\alpha/2} \hat{\sigma} \sqrt{V_j}\right) = 1 - \alpha$$

100 · (1 - α) % Confidence interval for β_j obtained by plugging in observed values for $\hat{\beta}_j$ and $\hat{\sigma}$:

$$(\hat{\beta}_j - t_{1-\alpha/2; N-p-1} \cdot \hat{\sigma} \sqrt{V_j}, \hat{\beta}_j + t_{1-\alpha/2; N-p-1} \cdot \hat{\sigma} \sqrt{V_j})$$