



RICE
JONES GRADUATE
SCHOOL OF BUSINESS

Linear Regression for Business Statistics



Linear Regression for Business Statistics

$$\text{Sales} = \beta_0 + \beta_1 \text{Price} + \beta_2 \text{AdExp} + \beta_3 \text{PromExp}$$



Linear Regression for Business Statistics

$$Sales = \beta_0 + \beta_1 Price + \beta_2 AdExp + \beta_3 PromExp$$



Could the true value of β_2 be 500?



Linear Regression for Business Statistics

$$Sales = \beta_0 + \beta_1 Price + \beta_2 AdExp + \beta_3 PromExp$$



Could the true value of β_2 be 500?

$$H_0: \beta_2 = 500$$

$$H_A: \beta_2 \neq 500$$

Linear Regression for Business Statistics

$$Sales = \beta_0 + \beta_1 Price + \beta_2 AdExp + \beta_3 PromExp$$



Could the true value of β_2 be 500?

$$H_0: \beta_2 = 500$$

$$H_A: \beta_2 \neq 500$$

Conclusion:

- Do not reject the Null hypothesis
- True value of β_2 could be 500
- We cannot reject the belief held by salespeople

Linear Regression for Business Statistics

Another approach to Hypothesis Testing



Linear Regression for Business Statistics

Another approach to Hypothesis Testing the p-value approach



Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**

Step 1 : Formulate Hypothesis

$$H_0: \beta_2 = 500$$

$$H_A: \beta_2 \neq 500$$

Step 2 : Calculate the t-statistic

$$\text{t-statistic} = \frac{b_2 - \beta_2}{s_{b_2}} = 0.711$$

Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**

Step 1 : Formulate Hypothesis



$$H_0: \beta_2 = 500$$

$$H_A: \beta_2 \neq 500$$

Step 2 : Calculate the t-statistic

$$\text{t-statistic} = \frac{b_2 - \beta_2}{s_{b_2}} = 0.711$$



Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**

Step 1 : Formulate Hypothesis

$$H_0: \beta_2 = 500$$

$$H_A: \beta_2 \neq 500$$

Step 2 : Calculate the t-statistic



$$\text{t-statistic} = \frac{b_2 - \beta_2}{s_{b_2}} = 0.711$$

Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**

Step 1 : Formulate Hypothesis

$$H_0: \beta_2 = 500$$

$$H_A: \beta_2 \neq 500$$

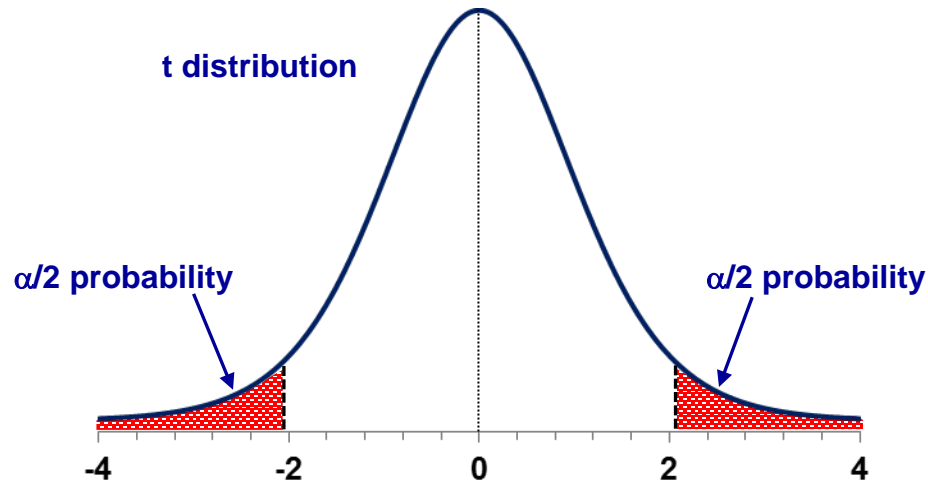
Step 2 : Calculate the t-statistic

$$\text{t-statistic} = \frac{b_2 - \beta_2}{s_{b_2}} = 0.711$$

Step 3 : Calculate the p-value

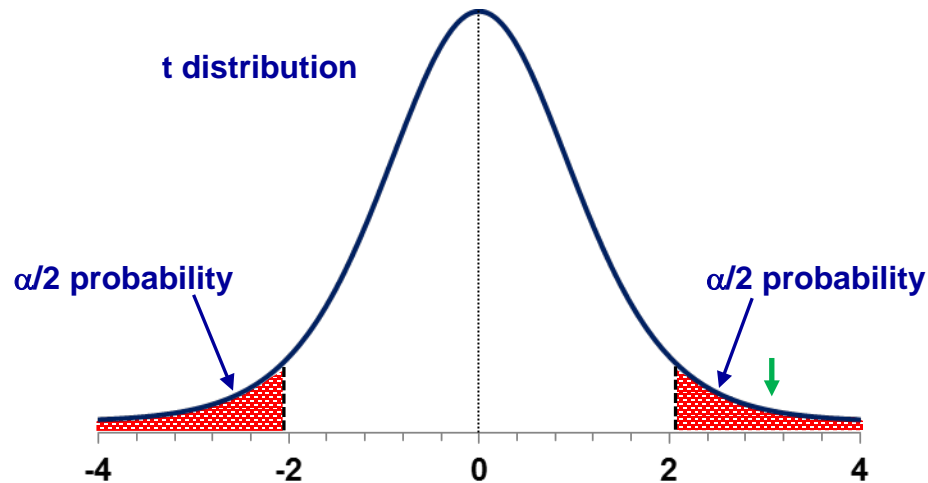
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



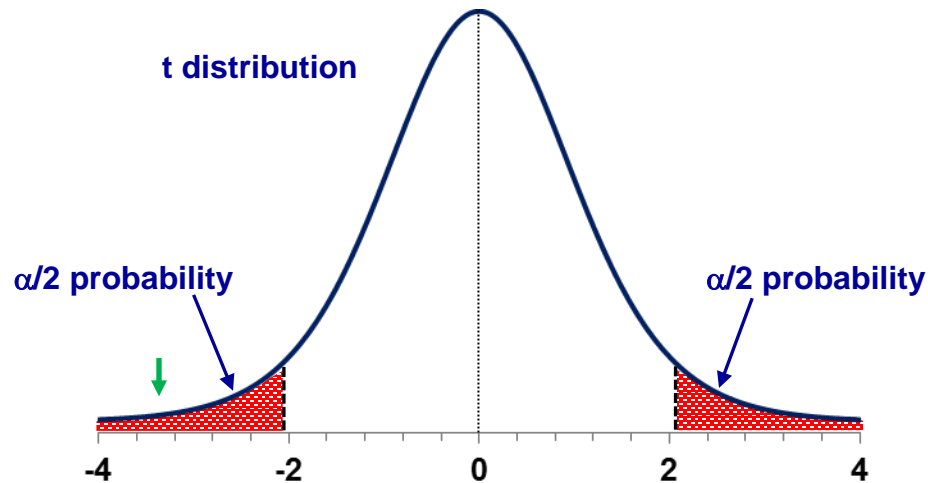
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



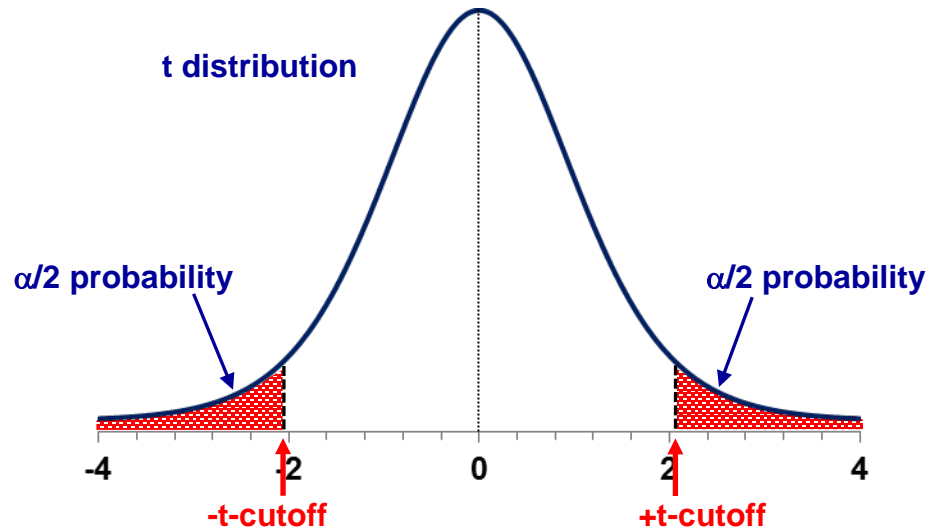
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



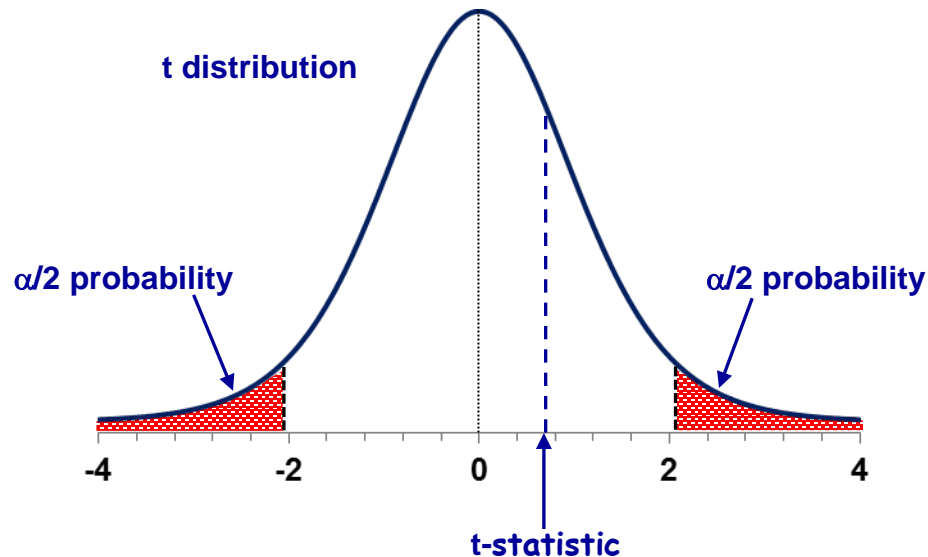
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



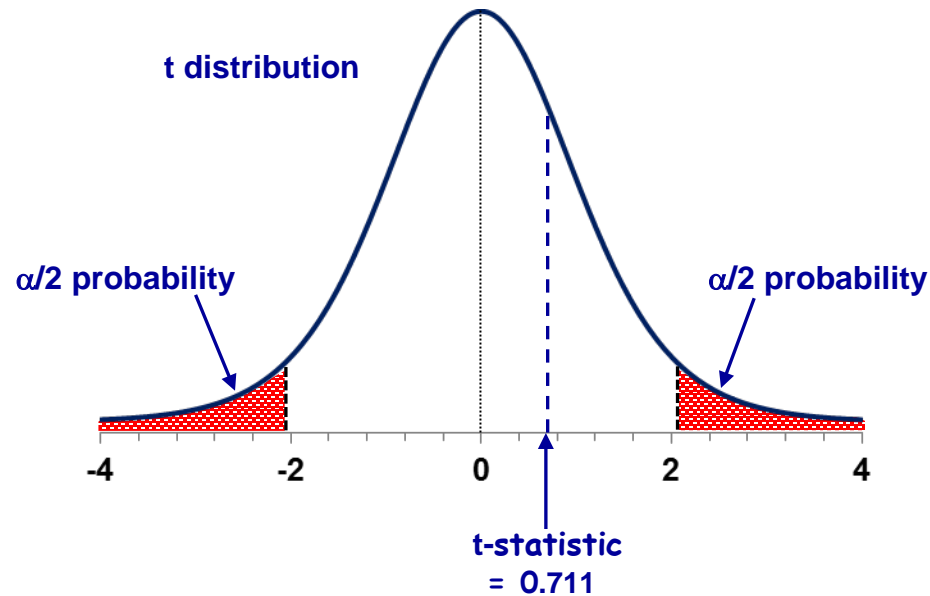
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



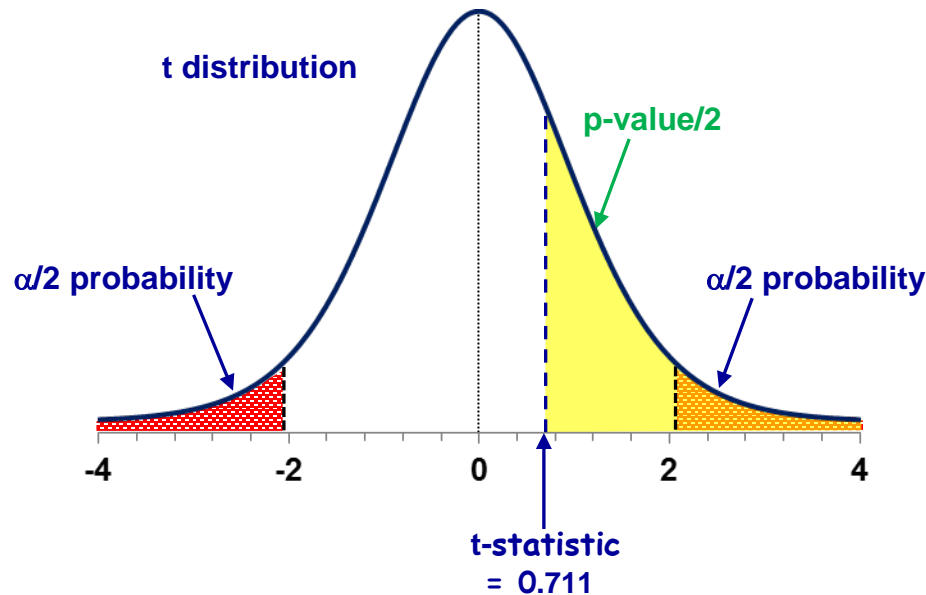
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



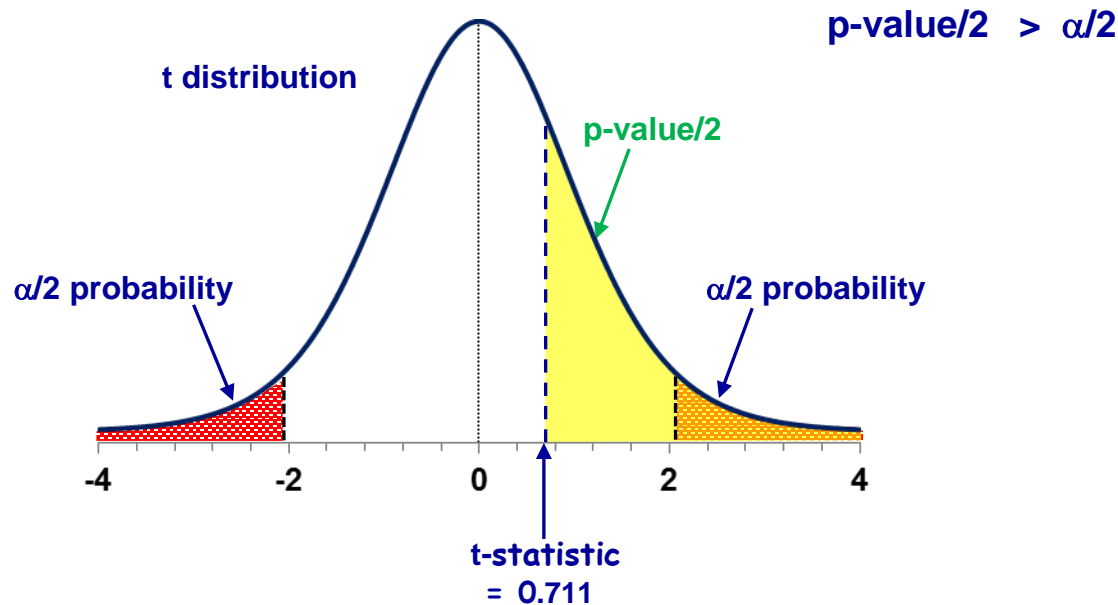
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



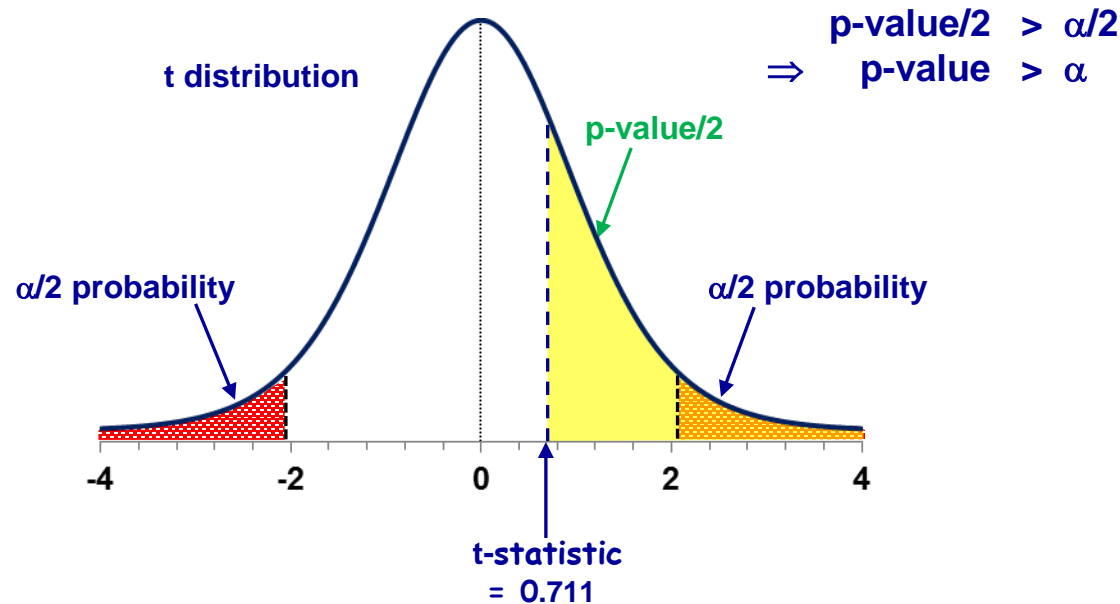
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



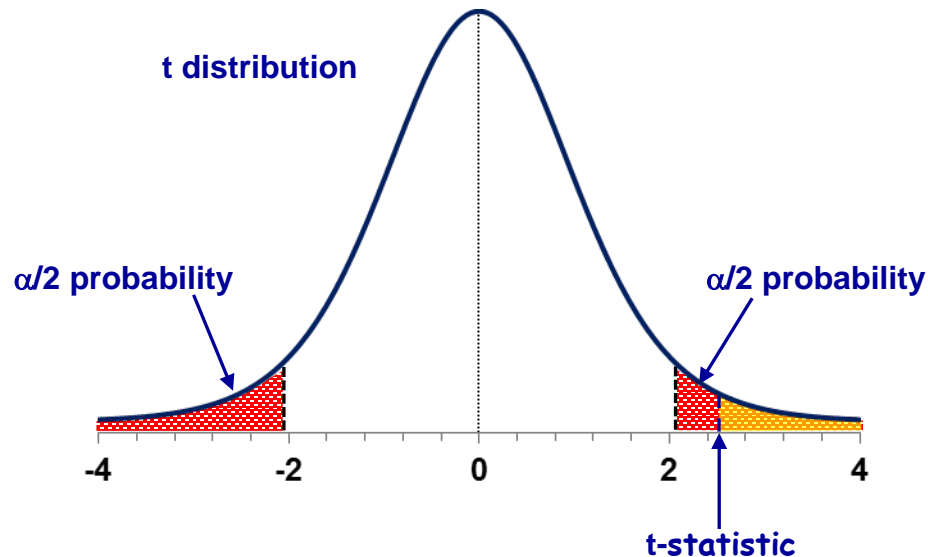
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



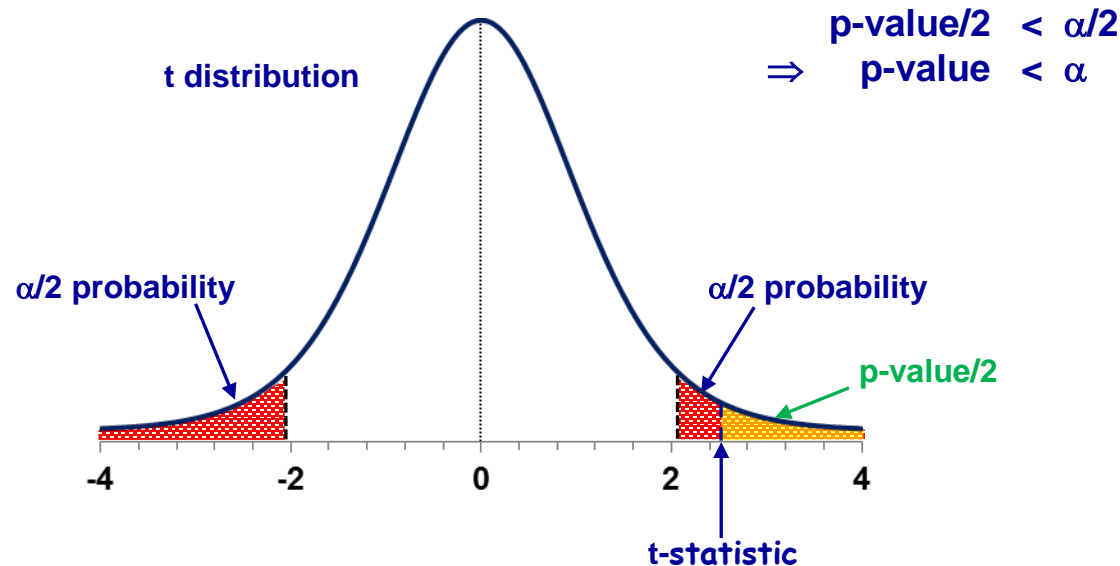
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



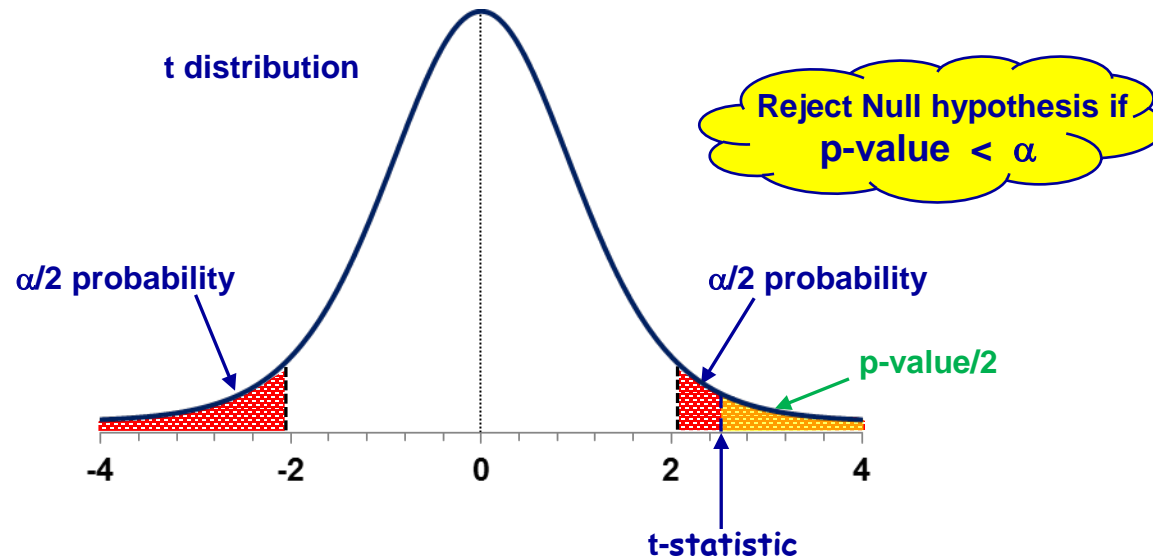
Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**



Linear Regression for Business Statistics

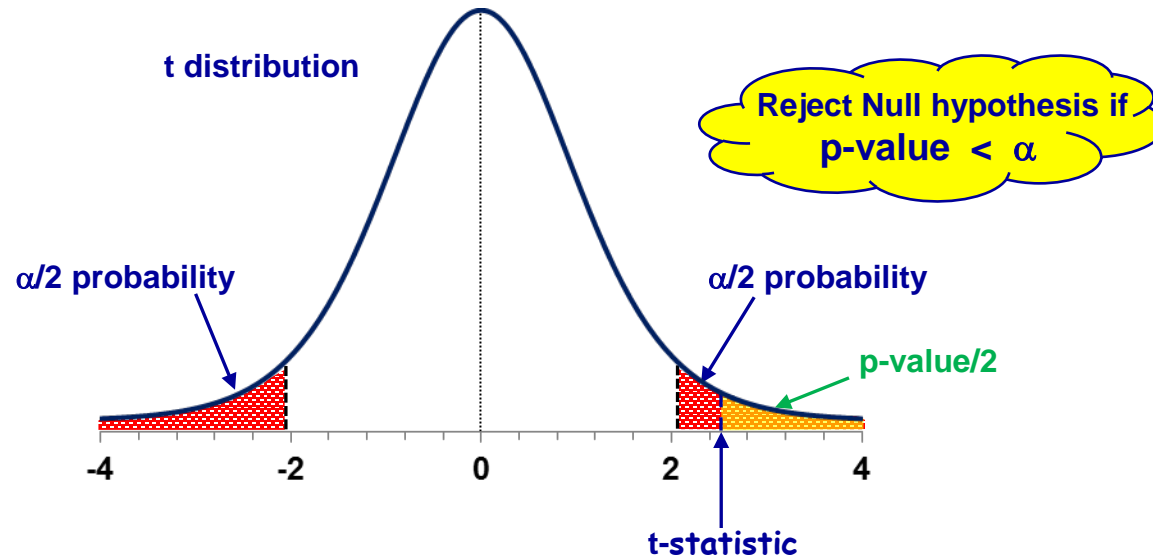
Another approach to Hypothesis Testing **the p-value approach**



Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**

$$\text{p-value} = 2 * \text{T.DIST}(-|\text{t-statistic}|, \text{residual df}, \text{TRUE})$$



Linear Regression for Business Statistics

Another approach to Hypothesis Testing the p-value approach

$$\begin{aligned}\text{p-value} &= 2 * \text{T.DIST}(-|\text{t-statistic}|, \text{residual df}, \text{TRUE}) \\ &= 0.4853\end{aligned}$$

Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**

$$\begin{aligned}\text{p-value} &= 2 * \text{T.DIST}(-|\text{t-statistic}|, \text{residual df}, \text{TRUE}) \\ &= 0.4853\end{aligned}$$

Conclusion:

- Do not reject the Null hypothesis
- We cannot reject the belief held by salespeople

Linear Regression for Business Statistics

Another approach to Hypothesis Testing **the p-value approach**

$$\begin{aligned}\text{p-value} &= 2 * \text{T.DIST}(-|\text{t-statistic}|, \text{residual df}, \text{TRUE}) \\ &= 0.4853\end{aligned}$$

Conclusion:

- Do not reject the Null hypothesis
- We cannot reject the belief held by salespeople

Linear Regression for Business Statistics

Hypothesis Testing in a regression context

- The t-cutoff approach
- The p-value approach

Linear Regression for Business Statistics

Hypothesis Testing in a regression context

- ➤ The t-cutoff approach
- The p-value approach

Linear Regression for Business Statistics

Hypothesis Testing in a regression context

- The t-cutoff approach

- ➔ ➤ The p-value approach

Linear Regression for Business Statistics

Hypothesis Testing in a regression context

- The t-cutoff approach
- The p-value approach
- ➤ *The confidence interval approach*