

## 7. cvičení

$$\begin{aligned} & \text{\textbackslash}\text{def}\text{\textbackslash}mcal\#1\{\text{\textbackslash}mathcal\{\#1\}\} \text{\textbackslash}\text{def}\text{\textbackslash}sca\#1\#2\{\text{\textbackslash}angle \#1, \#2 \text{\textbackslash}rangle\} \text{\textbackslash}\text{def}\text{\textbackslash}N\{\text{\textbackslash}mathbb{N}\} \\ & \text{\textbackslash}\text{def}\text{\textbackslash}R\{\text{\textbackslash}mathbb{R}\} \text{\textbackslash}\text{def}\text{\textbackslash}Q\{\text{\textbackslash}mathbb{Q}\}\} \text{\textbackslash}\text{def}\text{\textbackslash}Z\{\text{\textbackslash}mathbb{Z}\}\} \text{\textbackslash}\text{def}\text{\textbackslash}D\{\text{\textbackslash}mathbb{D}\}\} \\ & \text{\textbackslash}\text{def}\text{\textbackslash}bm\#1\{\text{\textbackslash}boldsymbol\{\#1\}\} \text{\textbackslash}\text{def}\text{\textbackslash}vv\#1\{\text{\textbackslash}mathbf\{\#1\}\} \text{\textbackslash}\text{def}\text{\textbackslash}vp\#1\{\text{\textbackslash}pmb\{\#1\}\} \\ & \text{\textbackslash}\text{def}\text{\textbackslash}floor\#1\{\text{\textbackslash}lfloor \#1 \text{\textbackslash}rfloor\} \text{\textbackslash}\text{def}\text{\textbackslash}ceil\#1\{\text{\textbackslash}lceil \#1 \text{\textbackslash}rceil\} \text{\textbackslash}\text{def}\text{\textbackslash}grad\#1\{\text{\textbackslash}mathrm\{grad\} , \#1\} \\ & \text{\textbackslash}\text{def}\text{\textbackslash}ve\{\text{\textbackslash}varepsilon\} \text{\textbackslash}\text{def}\text{\textbackslash}im\#1\{\text{\textbackslash}mathrm\{im\}(\#1)\} \text{\textbackslash}\text{def}\text{\textbackslash}tr\#1\{\text{\textbackslash}mathrm\{tr\}(\#1)\} \\ & \text{\textbackslash}\text{def}\text{\textbackslash}norm\#1\{\text{\textbackslash}left\text{\textbackslash}vert \text{\textbackslash}left\text{\textbackslash}vert \#1 \text{\textbackslash}right\text{\textbackslash}vert\text{\textbackslash}right\text{\textbackslash}vert\} \text{\textbackslash}\text{def}\text{\textbackslash}sca\#1\#2\{\text{\textbackslash}angle \#1, \#2 \text{\textbackslash}rangle\} \\ & \text{\textbackslash}\text{def}\text{\textbackslash}ex\#1\{\text{\textbackslash}mathrm\{E\} ,\text{\textbackslash}left( \#1\text{\textbackslash}right)\} \text{\textbackslash}\text{def}\text{\textbackslash}exv\#1\{\text{\textbackslash}mathrm\{E\} ,\text{\textbackslash}vv\{\#1\}\} \end{aligned}$$

Nechť  $\mathbf{Y}$  jsou data,  $\hat{\mathbf{Y}} = \mathbf{X} \hat{\boldsymbol{\beta}}$ ,  $\mathbf{E} \hat{\mathbf{Y}} = \mathbf{E} \mathbf{Y}$  je odhad  $\mathbf{Y}$  a  $\mathbf{e}$  je odhad  $\mathbf{v}$ .

A máme **celkovou sumu čtverců**  $TSS = \sum_{i=1}^n (Y_i - \overline{Y})^2$  také **vysvětlovanou sumu čtverců**  $ESS = \sum_{i=1}^n (\hat{Y}_i - \overline{Y})^2$  a  
neposlední řadě **reziduální sumu čtverců**  $RSS = \sum_{i=1}^n (Y_i - \hat{Y}_i)^2$

A platí  $TSS = RSS + ESS$

a nechť  $R^2$  je **koeficient determinace**  $R^2 = \frac{ESS}{TSS} \in (0, 1]$  a **adjustovaný koeficient determinace**  $R^2_{adj} = 1 - \frac{\frac{RSS}{n-p}}{\frac{TSS}{n-1}}$

Dále  $\hat{\sigma}^2 = \frac{RSS}{n - p}$  a  $var(\hat{vvp \beta}) = \hat{\sigma}^2 (vvp X^T vvp X)^{-1}$  Přičemž  $var(\hat{vvp \beta})$  dostaneme pomocí `vcov(<model>)`