

For Ch2 (part i)

10:52 AM 92%

[MAT3017] Conte... [STA302] Applied... Hofstadter - Gode... simple linear regr... simple linear regr...

Estimating σ^2 (cont...)

- RSS can be calculated by its definition

$$\begin{aligned}
 RSS &= \sum_i (y_i - \hat{\beta}_0 - \hat{\beta}_1 x_i)^2 = \sum_i [y_i - \bar{y} - \hat{\beta}_1(x_i - \bar{x})]^2 \\
 &= SY Y + \hat{\beta}_1^2 SX X - 2\hat{\beta}_1 SXY \\
 &= SY Y + \frac{SXY^2}{SXX^2} SX X - 2\frac{SXY^2}{SXX} \\
 &= SY Y - \frac{SXY^2}{SXX} = SY Y - \hat{\beta}_1^2 SX X
 \end{aligned}$$

$= \sum (y_i - \bar{y})^2 - 2\hat{\beta}_1 \sum (y_i - \bar{y})(x_i - \bar{x}) + \sum \hat{\beta}_1^2 (x_i - \bar{x})^2$

- Forbes' data:

$$\begin{aligned}
 RSS &= 427.79402 - \frac{475.31224^2}{530.78235} = 2.15493 \\
 \hat{\sigma}^2 &= 2.15493 / (17 - 2) = 0.14366, \text{ i.e., } \hat{\sigma} = 0.37903
 \end{aligned}$$
