

Proof from Week 4, slide 41

$$\begin{aligned}\sum_{i=1}^n (\hat{y}_i - \bar{y})^2 &= \sum_{i=1}^n [b_0 + b_1 x_i - (b_0 + \bar{x} b_1)]^2 \\ &= \sum_{i=1}^n (b_1 x_i - \bar{x} b_1)^2 \\ &= b_1^2 \sum_{i=1}^n (x_i - \bar{x})^2\end{aligned}$$