# Lab 08 Bootstrapping of a variance estimator

bias $= E[\hat{\theta}] - \theta$

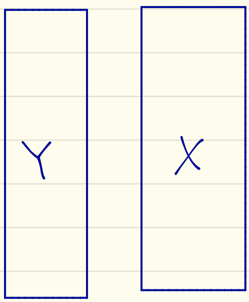
$\hat{\theta} - (\text{bias}) \to$ bias-corrected estimator

$\bar{\theta}^* - \hat{\theta}$ = bias estimator $\quad 89.09 - 92.46 = -3.37$

Bias corrected: $\hat{\theta} - [\bar{\theta}^* - \hat{\theta}] = 2\hat{\theta} - \bar{\theta}^* = 94.83$

$0.7764 \Rightarrow$ CI of level 95% , $(0.3419, 0.9389)$

$$\hookrightarrow \frac{\sum X_i Y_i - \sum X_i \sum Y_i}{\sqrt{\left(\sum X_i^2 - \frac{(\sum X)^2}{n}\right)\left(\sum Y_i^2 - \frac{(\sum Y_i)^2}{n}\right)}}$$




$$\|Y - X\beta\|^2 \xrightarrow[\hat{\beta}]{\min} \quad Y_i - \hat{X}_i \hat{\beta} = \tilde{\varepsilon}_i \leftrightarrow \text{Bootstrapping}$$

$i : (1, 1, \dots, n)$

$\hat{\varepsilon}_1, \dots, \hat{\varepsilon}_n$

$\hat{\varepsilon}^*_{11}, \hat{\varepsilon}^*_{21}, \dots, \hat{\varepsilon}^*_{n1}$

$Y_i^* = \hat{\beta} X_i + \hat{\varepsilon}^*_{11}$

$$\begin{pmatrix} \hat{\beta}^*_1 \\ \hat{\beta}^*_2 \end{pmatrix} \approx \hat{\beta}$$