□ $y = X \cdot b + e$

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_{10} \end{bmatrix} = \begin{bmatrix} 1 & 176 \\ 1 & 177 \\ \vdots & \vdots \\ 1 & 184 \end{bmatrix} \cdot \begin{bmatrix} b_0 \\ b_1 \end{bmatrix} + \begin{bmatrix} e_1 \\ e_2 \\ \vdots \\ e_{10} \end{bmatrix}$$

$$y_1 = 1 \cdot b_0 + 176 \cdot b_1 + e_1$$
$$y_2 = 1 \cdot b_0 + 177 \cdot b_1 + e_2$$

$$y_{10} = 1 \cdot b_0 + 184 \cdot b_1 + e_{10}$$

$$\hat{b} = (X^T X)^{-1} X^T y$$

Inverse of $(X^T X)$ is defined as the matrix M such that

$M(X^T X) = I$ where I is identity

$(X^T X)^{-1}(X^T X) = I$

$$X^T X = \begin{bmatrix} 1 & 1 & \cdots & 1 \\ 176 & 177 & \cdots & 184 \end{bmatrix} \begin{bmatrix} 1 & 176 \\ 1 & 177 \\ \vdots & \vdots \\ 1 & 184 \end{bmatrix} = \begin{bmatrix} 10 & 1799 \\ 1799 & 323[illegible] \end{bmatrix}$$

$$X^T X = \begin{bmatrix} N & X_\bullet \\ X_\bullet & (X^2)_\bullet \end{bmatrix}$$

$$X_\bullet = \sum_{i=1}^{N=10} x_i \quad ; \quad (X^2)_\bullet = \sum_{i=1}^{N=10} x_i^2$$