A04

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$\hat{y} = a \cdot x + b \qquad M_2 \cdot c = y$

$$M_2 = \begin{pmatrix} x_1 & 1 \\ x_2 & 1 \\ \vdots & \vdots \\ x_n & 1 \end{pmatrix}, \quad c = \begin{pmatrix} a \\ b \end{pmatrix}, \quad y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}$$

$M_2 \cdot c = y \qquad (M_2^T \cdot M_2)^{-1} \cdot M_2 = I$

$$\begin{pmatrix} x_1 & 1 \\ x_2 & 1 \\ \vdots & \vdots \\ x_n & 1 \end{pmatrix} \cdot \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix} \quad \left(\begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ 1 & 1 & \cdots & 1 \end{pmatrix} \cdot \begin{pmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{pmatrix} \right)^{-1} \begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ 1 & 1 & \cdots & 1 \end{pmatrix} \cdot$$

$$\begin{pmatrix} a \\ b \end{pmatrix} = \left(\begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ 1 & 1 & \cdots & 1 \end{pmatrix} \cdot \begin{pmatrix} x_1 & 1 \\ x_2 & 1 \\ \vdots & \vdots \\ x_n & 1 \end{pmatrix} \right)^{-1} \cdot \begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ 1 & 1 & \cdots & 1 \end{pmatrix} \cdot \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}$$

$$M_2^T = \begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ 1 & 1 & \cdots & 1 \end{pmatrix} \qquad M_2^T \cdot M_2 = \begin{pmatrix} x_1^2 + x_2^2 + \ldots + x_n^2 & x_1 + x_2 + x_3 \\ x_1 + x_2 + \ldots + x_n & n \end{pmatrix}$$

$$\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} \overline{\sum} x_i^2 & \overline{\sum} x_i \\ \overline{\sum} x_i & n \end{pmatrix}^{-1} \cdot \begin{pmatrix} x_1 & x_2 & \cdots & x_n \\ 1 & 1 & \cdots & 1 \end{pmatrix} \cdot \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}$$

$$\begin{pmatrix} a \\ b \end{pmatrix} = \text{---''---} \cdot \begin{pmatrix} x_1 \cdot y_1 + x_2 \cdot y_2 + \ldots + x_n \cdot y_n \\ y_1 + y_2 + \ldots + y_n \end{pmatrix}$$

$$\begin{pmatrix} a \\ b \end{pmatrix} = \text{---''---} \cdot \begin{pmatrix} \overline{\sum} x_i \cdot y_i \\ \overline{\sum} y_i \end{pmatrix}$$

as this formula is the same as ref A03:i :

final calculation see A03 $\hat{y} = 0.4211 \cdot x + 1.5263$

$$\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 0.4211 \\ 1.5263 \end{pmatrix}$$