

$$X^T X \beta = X^T Y$$

$$\underbrace{\begin{bmatrix} \sum_{i=1}^3 & \dots & \sum_{i=1}^3 \\ \sum_{i=1}^3 x_{i1} & \sum_{i=1}^3 x_{i1}^2 & \dots & \sum_{i=1}^3 x_{i1} x_{ip} \\ \vdots & \vdots & \ddots & \vdots \\ \sum_{i=1}^3 x_{i1} x_{ip} & \sum_{i=1}^3 x_{ip}^2 & \dots & \sum_{i=1}^3 x_{ip}^2 \end{bmatrix}}_{X^T X} \underbrace{\begin{bmatrix} \beta_0 \\ \beta_1 \\ \vdots \\ \beta_p \end{bmatrix}}_{\beta} = \underbrace{\begin{bmatrix} \sum_{i=1}^3 y_i \\ \sum_{i=1}^3 x_{i1} y_i \\ \vdots \\ \sum_{i=1}^3 x_{ip} y_i \end{bmatrix}}_{X^T Y}$$