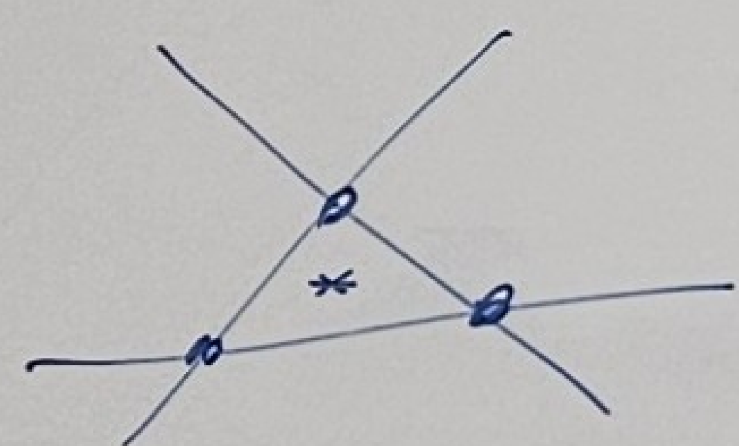
$$\begin{cases} 2x+3y=1 \\ x-4y=-9 \\ 2x-y=-1 \end{cases}$$

$$\begin{bmatrix}2 & 3\\ 1 & -4\\ 2 & -1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}=\begin{bmatrix}1\\ -9\\ -1\end{bmatrix}$$

$$A w = B \quad / \cdot A^{-1}$$

$$w = A^{-1} B$$



np. linalg.inv

A @ B   A.T

$$A w = B \quad / \cdot A^{T}$$

$$A^{T} A w = A^{T} B \quad / \cdot (A^{T}A)^{-1}$$

$$w = (A^{T}A)^{-1} A^{T} B$$

2. w domu: wyprow. prawo-stronną odwrot.

1. w domu: dla $A_{M \times M}$

$$(A^T)^T = A$$

$$(A^{-1})^{-1} = A$$

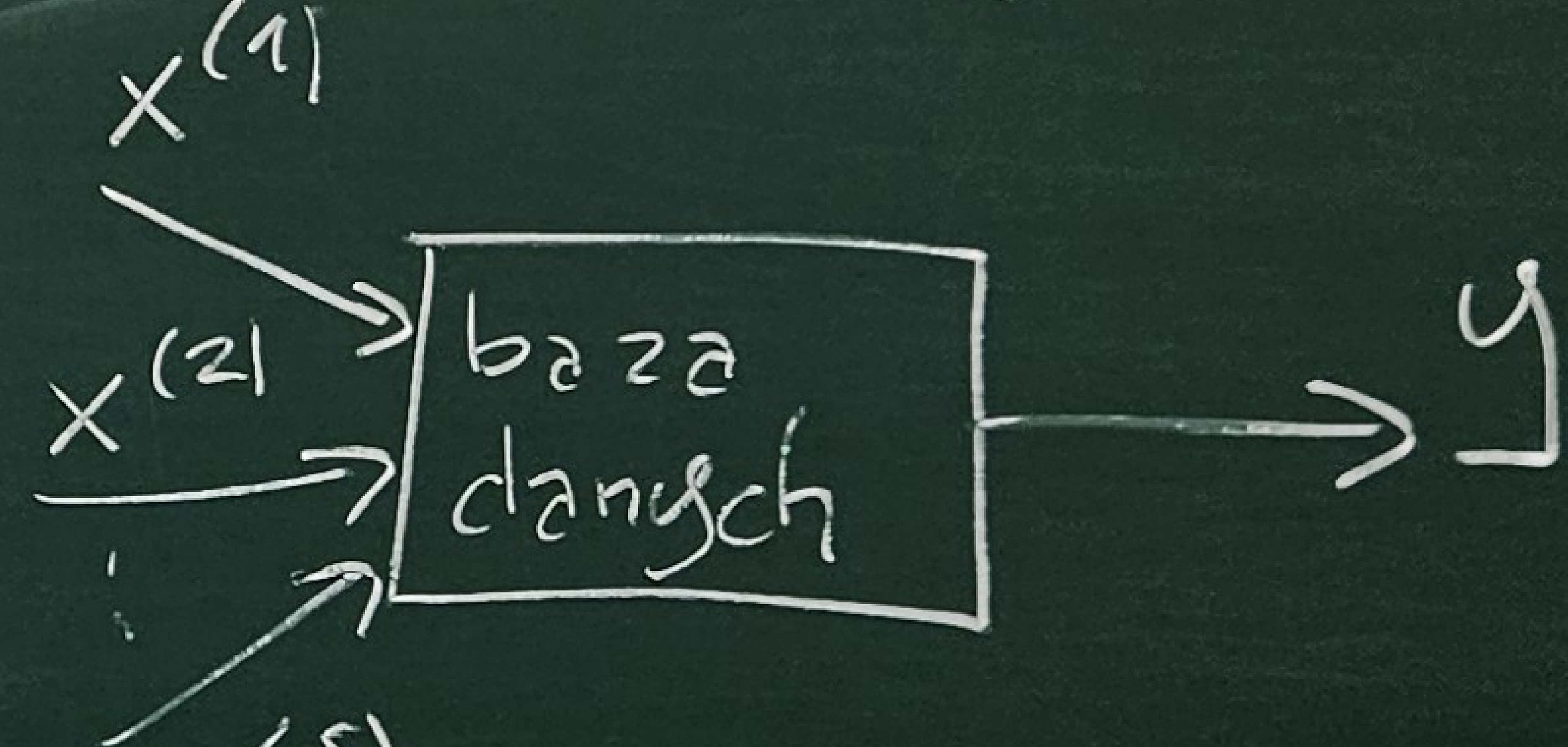
$$(A^T)^{-1} = (A^{-1})^T$$

$$(A \pm B)^T = A^T + B^T$$

$$\cancel{(A \pm B)^{-1} = A^{-1} + B^{-1}}$$

$$(A \cdot B)^T = B^T A^T$$

$$(A \cdot B)^{-1} = B^{-1} A^{-1}$$



$$\left\{ \begin{bmatrix} x_i^{(1)} \\ \vdots \\ x_i^{(S)} \end{bmatrix}, y_i \right\}_{i=1}^{N}$$

$$\{\mathbf{x}_i, y_i\}_{i=1}^{N}$$

$y_i \in \mathbb{R}$ - regresja

$$\underline{\hat{y} = \phi(x; \Theta)} \qquad \hat{y} = \phi_{\Theta}(x)$$

$$X = \begin{bmatrix} x_1^{(1)} & x_2^{(1)} & \cdots & x_N^{(1)} \\ \vdots & \vdots & & \vdots \\ x_1^{(S)} & x_2^{(S)} & \cdots & x_N^{(S)} \end{bmatrix}$$

$$Y = \begin{bmatrix} y_1 & y_2 & \cdots & y_N \end{bmatrix}$$

$$\hat{Y} = \begin{bmatrix} \hat{y}_1 & \hat{y}_2 & \cdots & \hat{y}_N \end{bmatrix}$$

$$e = y - \hat{y}$$

$$e_i = y_i - \hat{y}_i$$

Dane: X, Y

Szukane: Θ

$$Y = \Theta^T X \quad / \cdot X^T$$

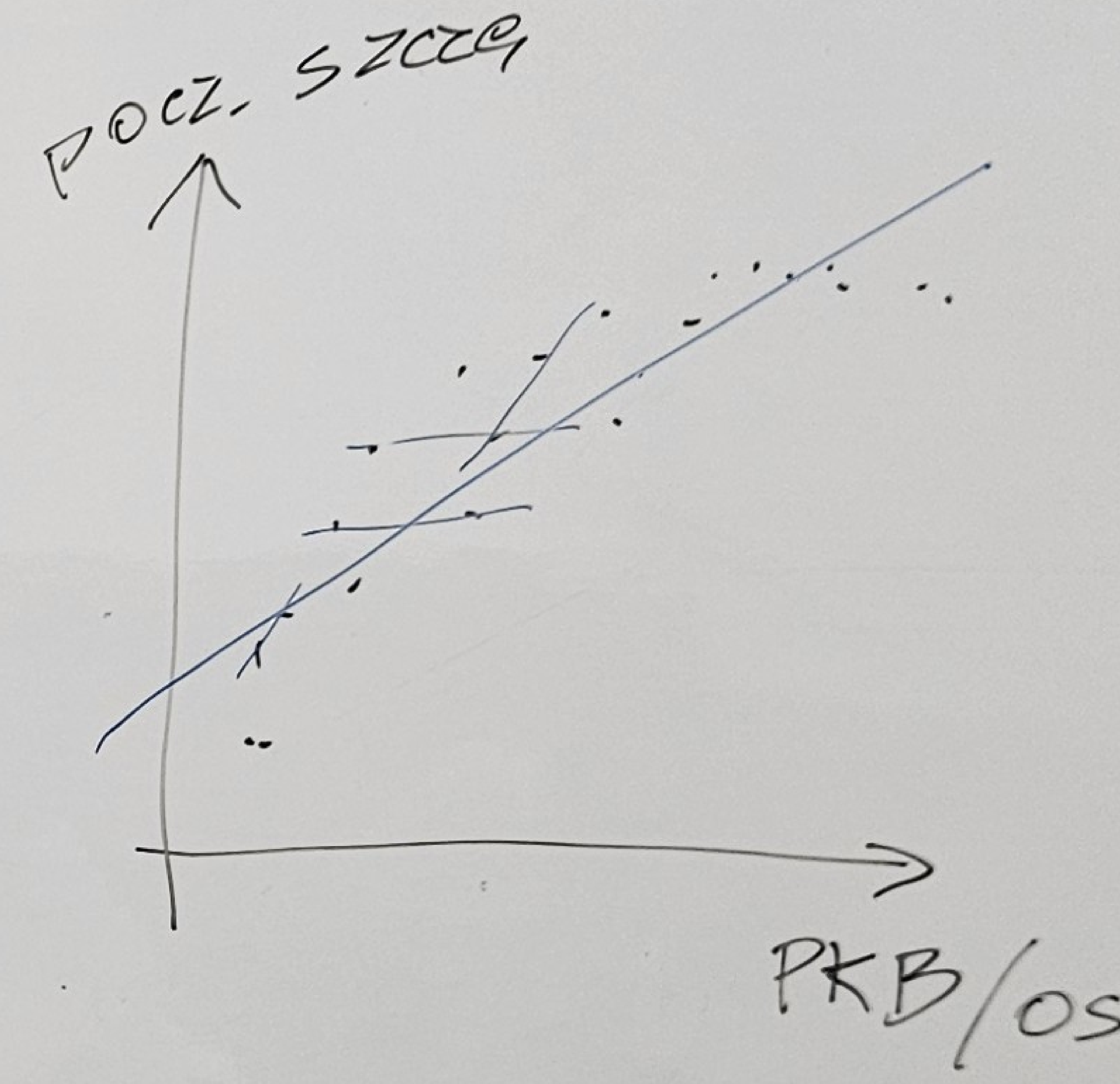
? w domu powtórz samodz

$$Y X^T = \Theta^T (X X^T)$$

$$Y X^T (X X^T)^{-1} = \Theta^T$$

$$\boxed{\hat{\Theta} = (X X^T)^{-1} X Y^T}$$

5×1



Aproksymacja średniokwadratowa.

Metoda najmn. kwadrat

jak rozumieć p-wartość?

$$\frac{dF}{dx} \overset{?}{\sim} \frac{\partial F}{\partial X}$$

Patryk Nogaś

np.

$$\hat{y}_i = a_1 x_i^{(1)} + a_2 x_i^{(2)} + \dots a_s x_i^{(s)} = \Theta^T x_i \qquad \Theta = \begin{bmatrix} a_1 \\ \vdots \\ a_s \end{bmatrix}$$

$$\hat{Y} = \Theta^T X$$

$$\hat{Y} = \begin{bmatrix} \Theta^T x_1 & \Theta^T x_2 & \cdots & \Theta^T x_N \end{bmatrix} = \Theta^T \begin{bmatrix} x_1 & x_2 & \cdots & x_N \end{bmatrix}$$