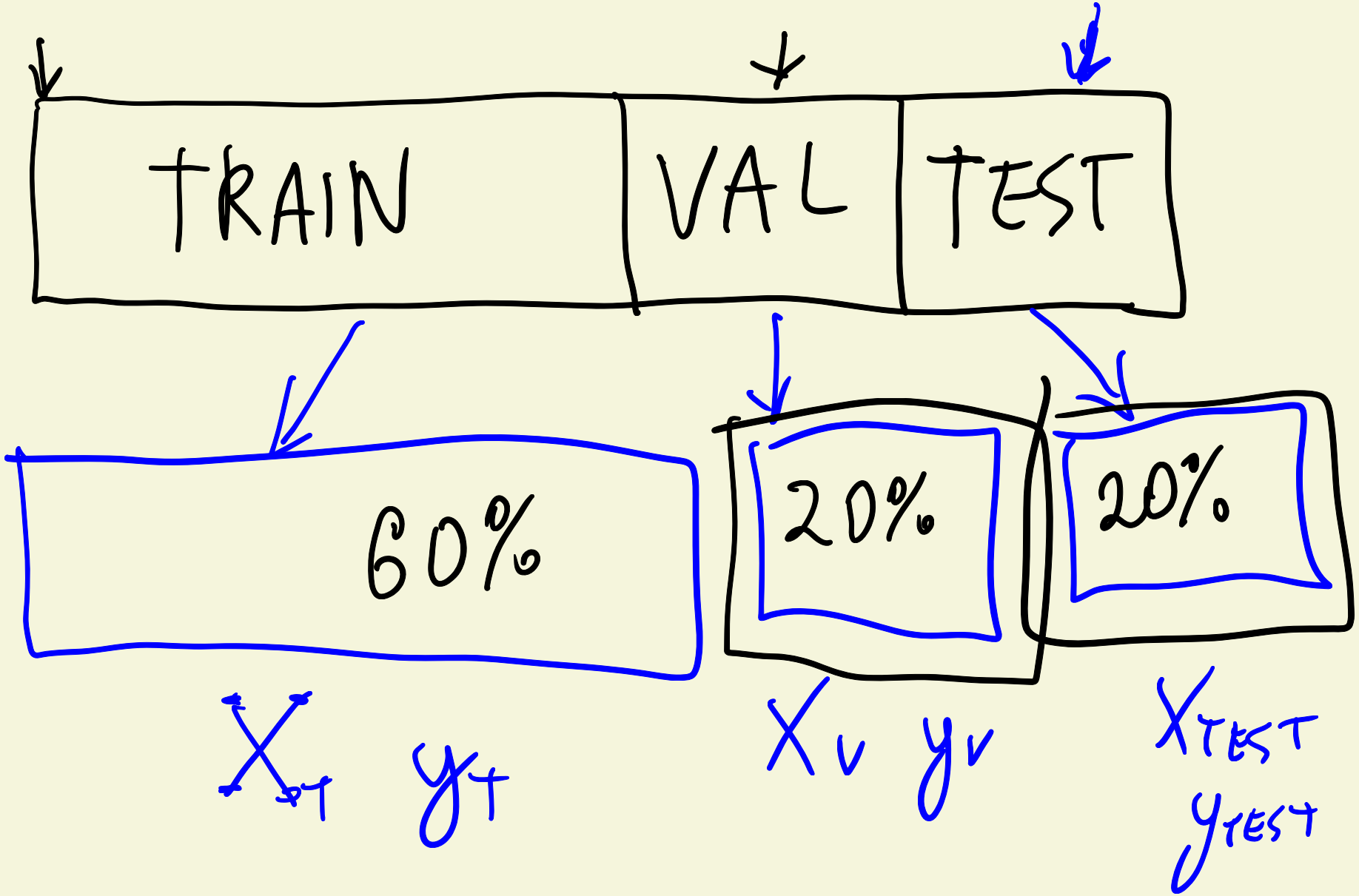
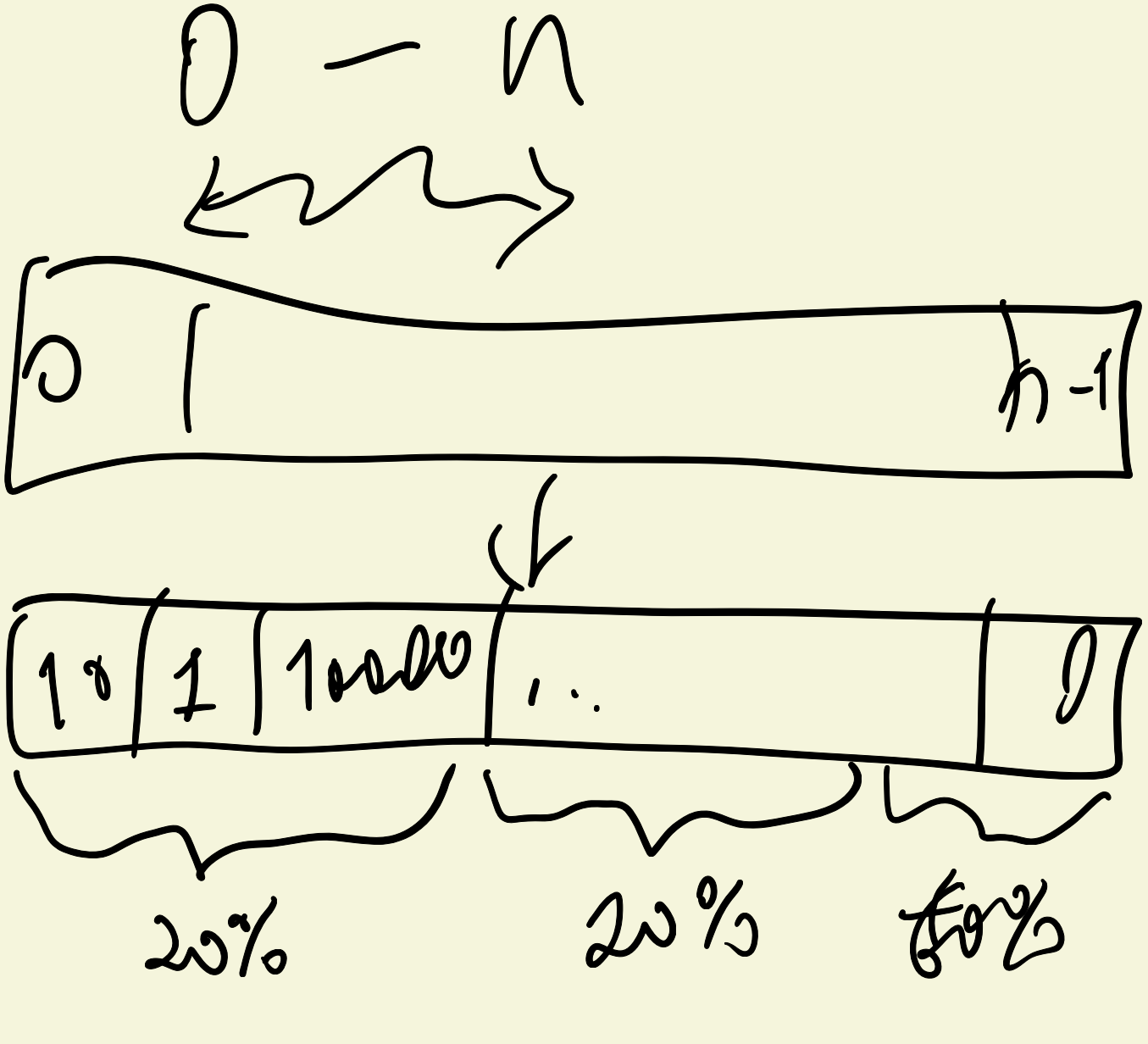
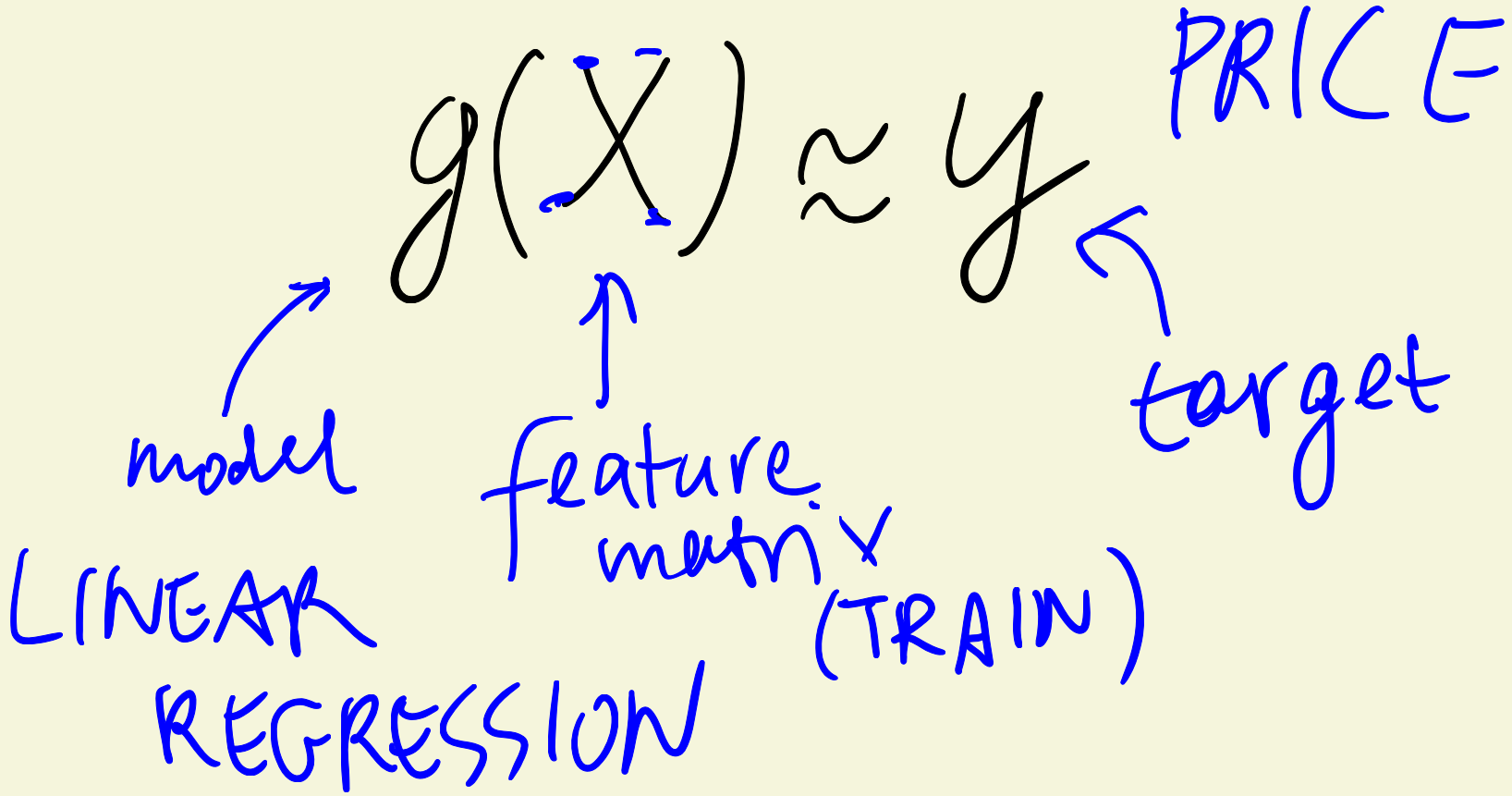

TRAIN
VAL
TEST
60%
20%
20%
X_T y_T
X_V y_V
X_{TEST}
y_{TEST}


0 — n
0
n-1
10
1
100
...
0
20%
20%
60%


$g(X) \approx y$
PRICE
model
LINEAR REGRESSION
feature matrix
X
(TRAIN)
target

$$g(x_i) \approx y_i$$

A CAR — ITS PRICE

$$x_{(i)} = (x_{i1}, x_{i2}, \ldots, x_{in})$$

$$g(x_{i1}, \ldots, x_{in}) \approx y_i$$

$$x_i = [453, 11, 86]$$

$i = 10$

$$g(x_i) \approx y_i$$

$$g(x_i) = W_0 + W_1 \cdot x_{i1} + W_2 \cdot x_{i2} + W_3 \cdot x_{i3}$$

$$g(x_i) = w_0 + w_1 \cdot x_{i1} + w_2 \cdot x_{i2} + w_3 \cdot x_{i3}$$

$$g(x_i) = w_0 + \sum_{j=1}^{3} w_j \cdot x_{ij}$$

W_0

$7.17 + 453 \cdot 0.01 + 11 \cdot 0.04 + 86 \cdot 0.002 =$

$1 \cdot 0.01$

$100 \cdot 0.01 = 1$

$= 12.3$

10000

$\log(y+1) = p$

$y + 1 = \exp(p)$

$\Rightarrow y = \exp(p) - 1$

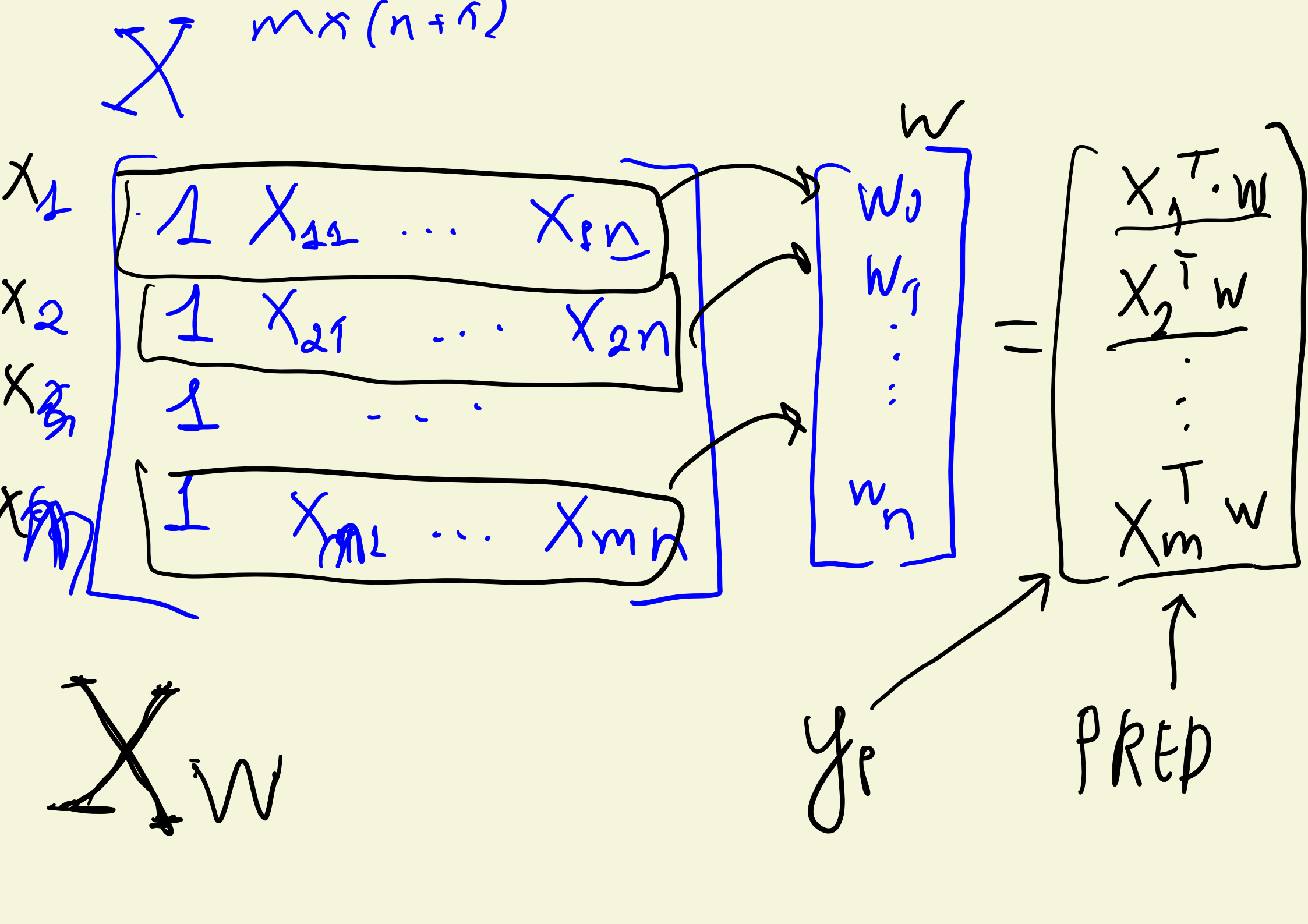
$$g(x_i) = w_0 + \boxed{\sum_{j=1}^{n} x_{ij} \cdot w_j} =$$

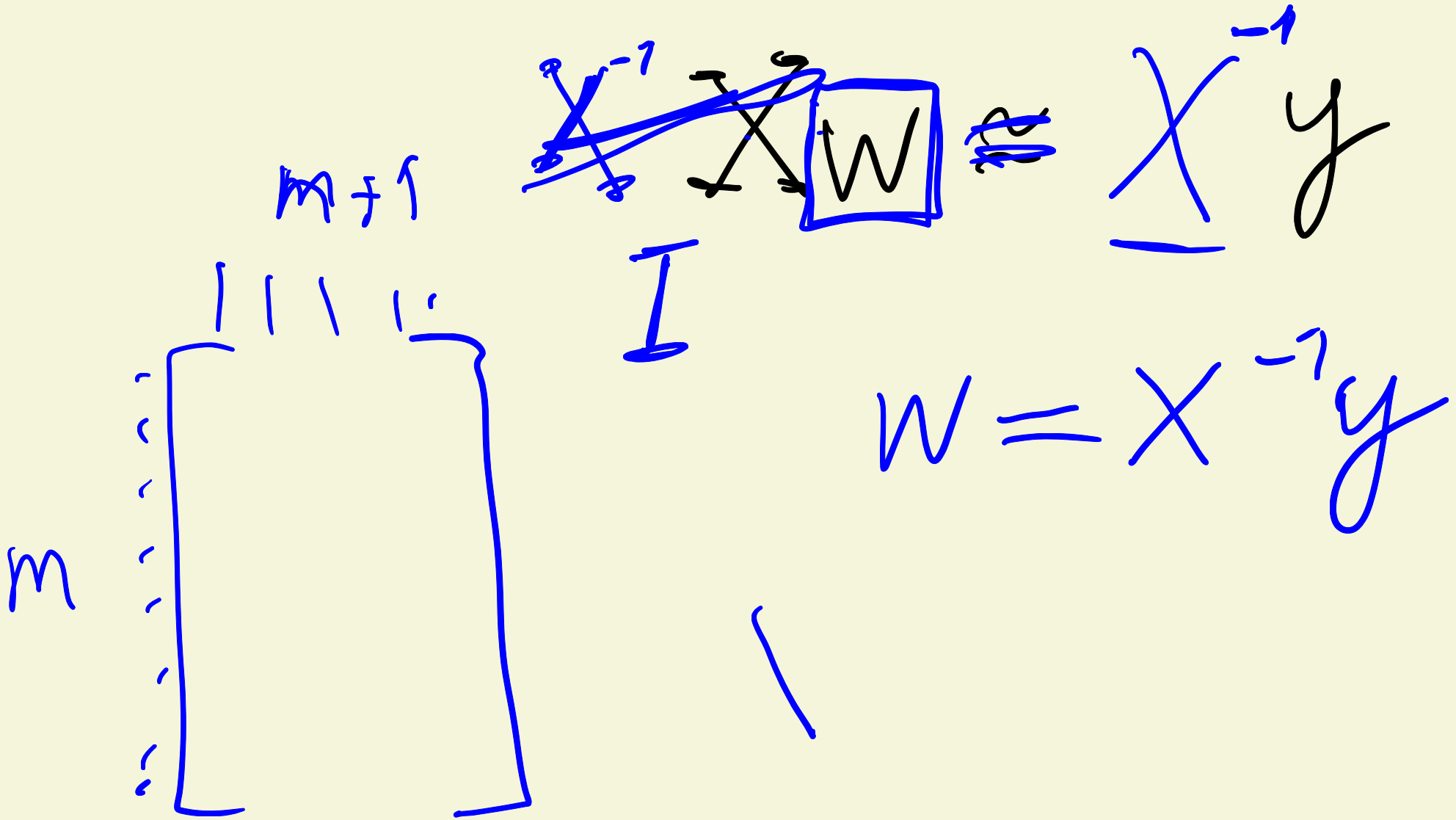
$$= w_0 \cdot \cancel{x_{i0}}^{1} + x_i^T w$$

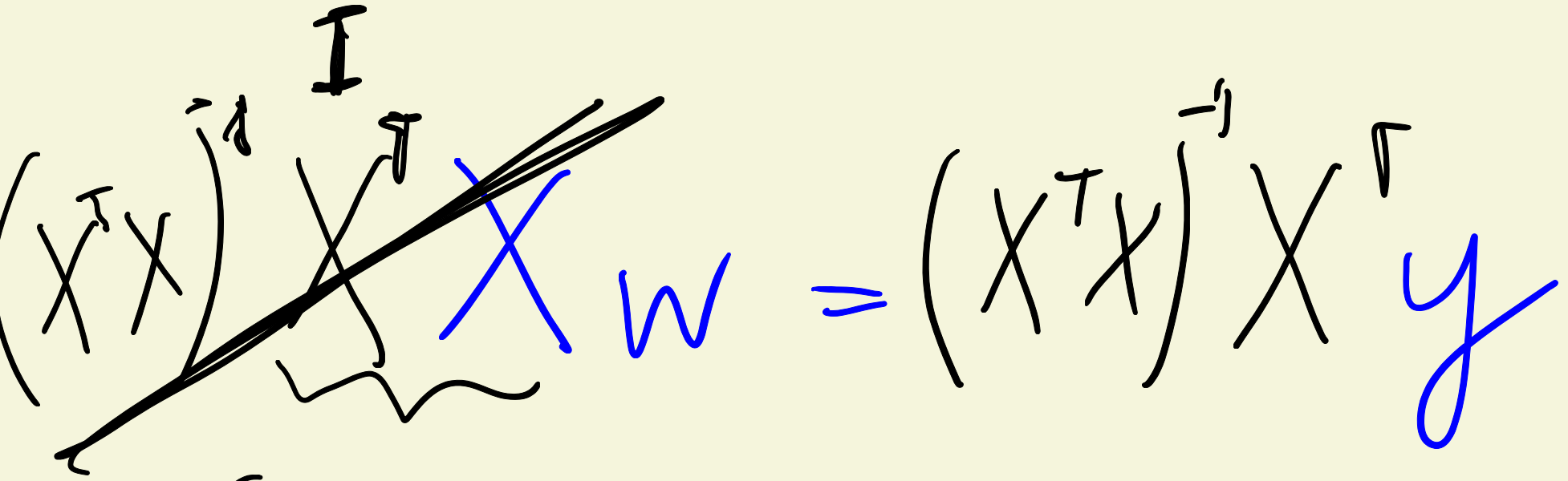
$$W = \left[w_0 \mid w_1 \; w_2 \; \cdots \; w_n \right]$$

$$x_i = \left[1 \; x_{i1} \; x_{i2} \; \cdots \; x_{in} \right]$$

$$\boxed{W^T x_i} = x_i^T W = w_0 + \ldots$$


X
m x (n+1)
w
x_1
x_2
x_3
x_m
1 x_{11} ... x_{1n}
1 x_{21} ... x_{2n}
1 ...
1 x_{m1} ... x_{mn}
w_0
w_1
w_n
=
$x_1^T \cdot w$
$x_2^T w$
$x_m^T w$
X_w
y_p
PRED


X^{-1}
$W = X^{-1}y$
$m+1$
I
m
$W = X^{-1}y$



GRAM
MATRIX
$(n+1) \times (n+1)$

$$\underline{\underline{w}} = \left(X^T X\right)^{-1} X^T y$$

$\dagger w = w$

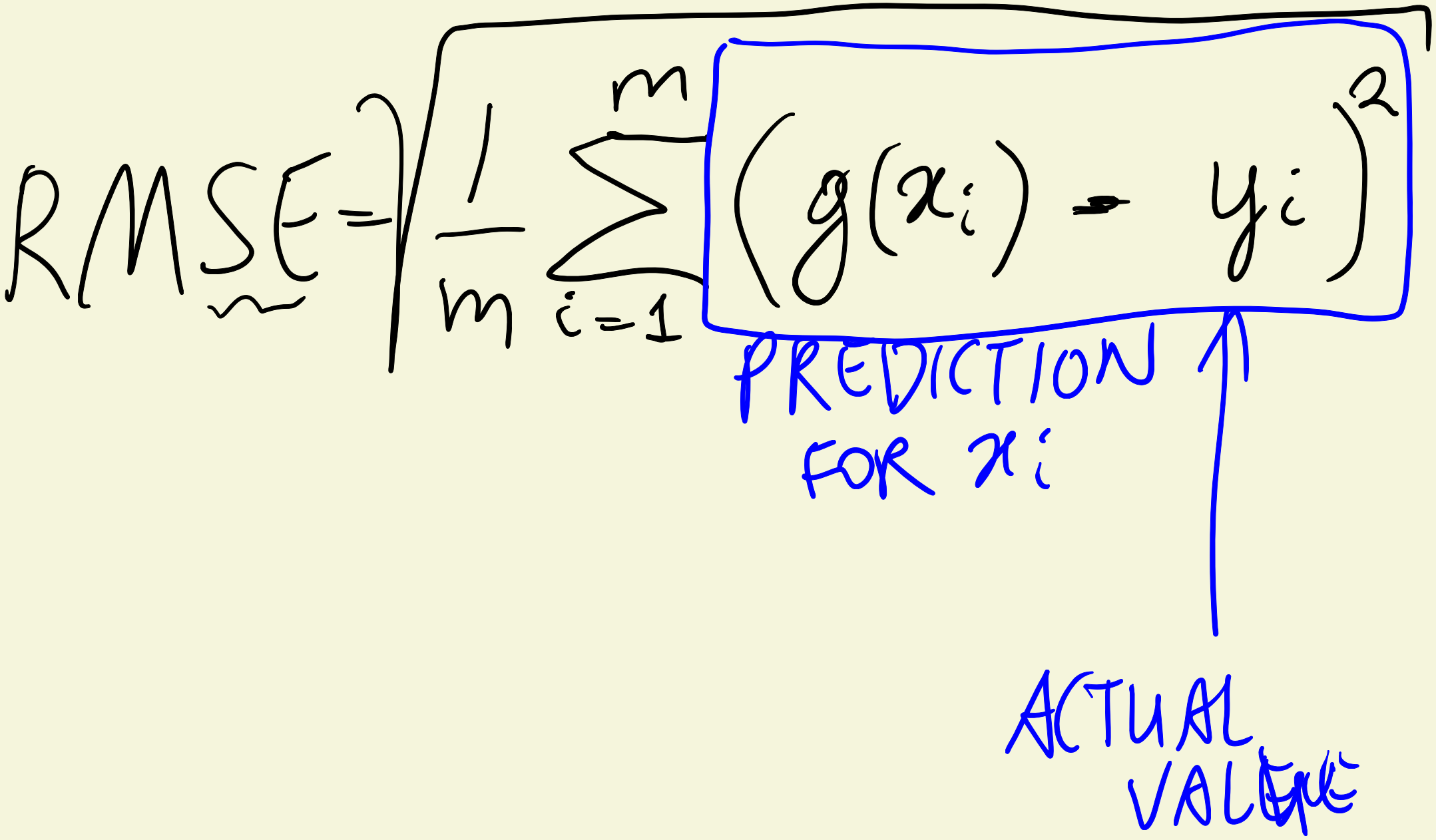
$$g(x_i) = w_0 + \cancel{x_{i1}} \cdot w_1 + x_{i2} \cdot w_2 =$$

0

missing

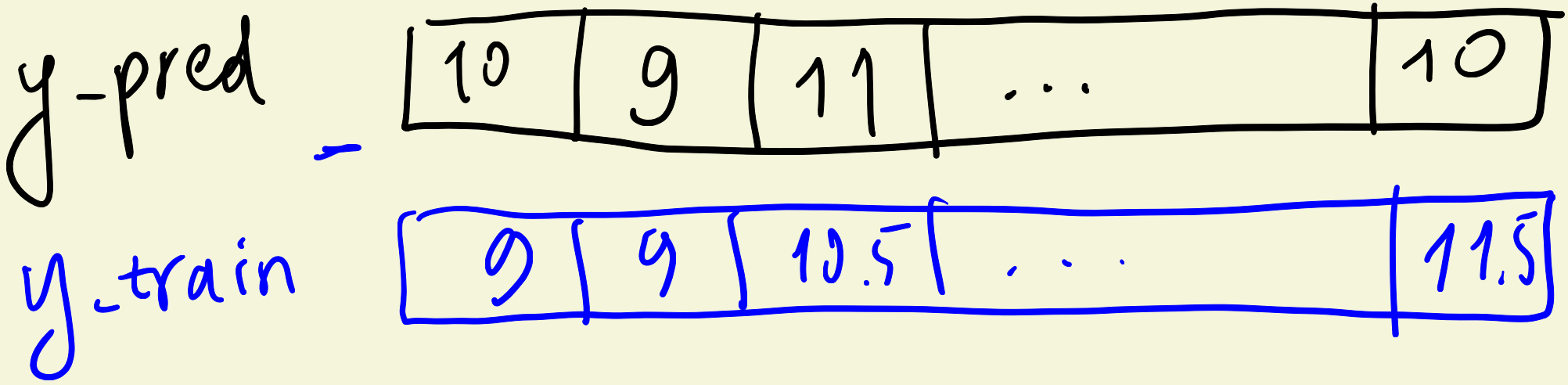
ENGINE HP

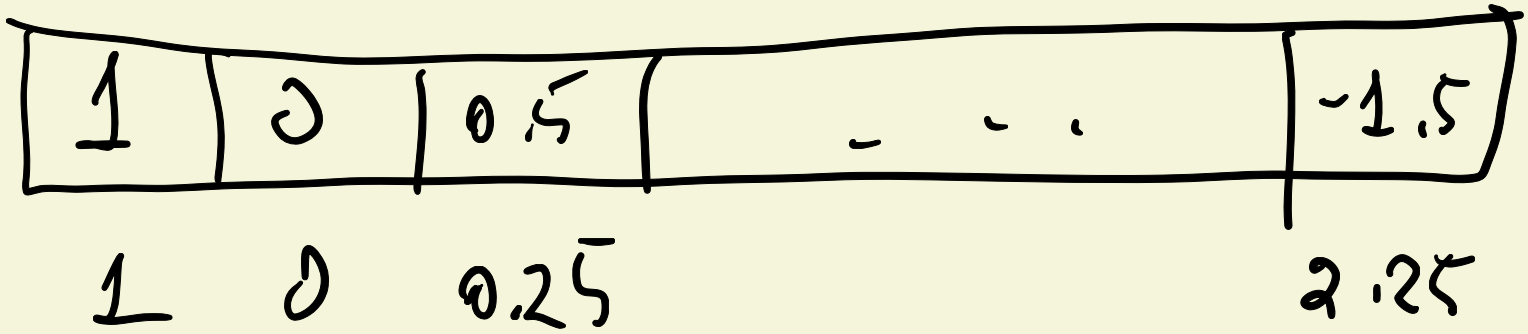
$$= w_0 + x'_{i2} \cdot w_2$$


RMSE = $\sqrt{\frac{1}{m}\sum_{i=1}^{m}\left(g(x_i) - y_i\right)^2}$
PREDICTION FOR x_i
ACTUAL VALUE

$$\left[g(x_i) - y_i \right]^2$$

PRED PRICE



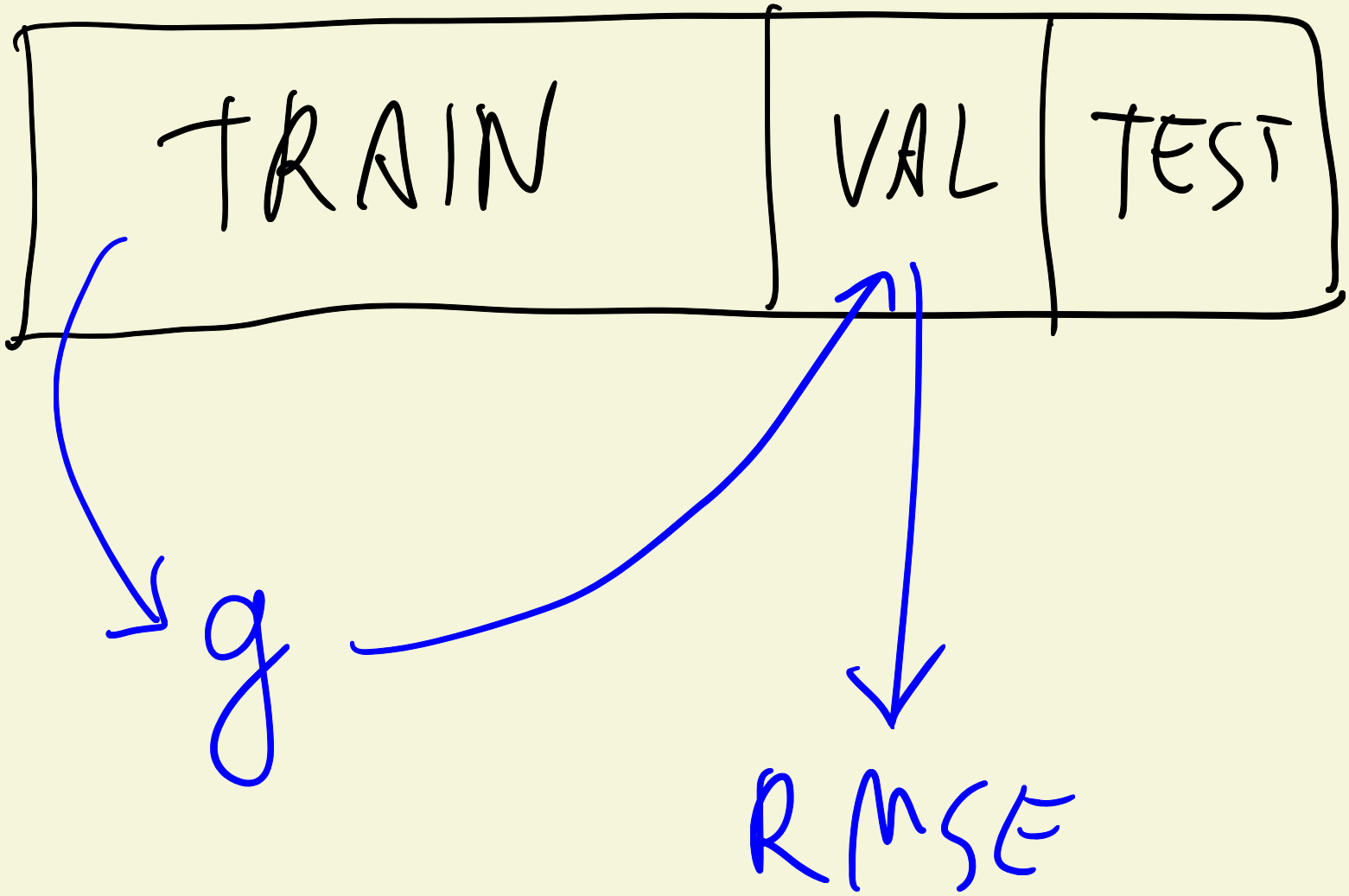


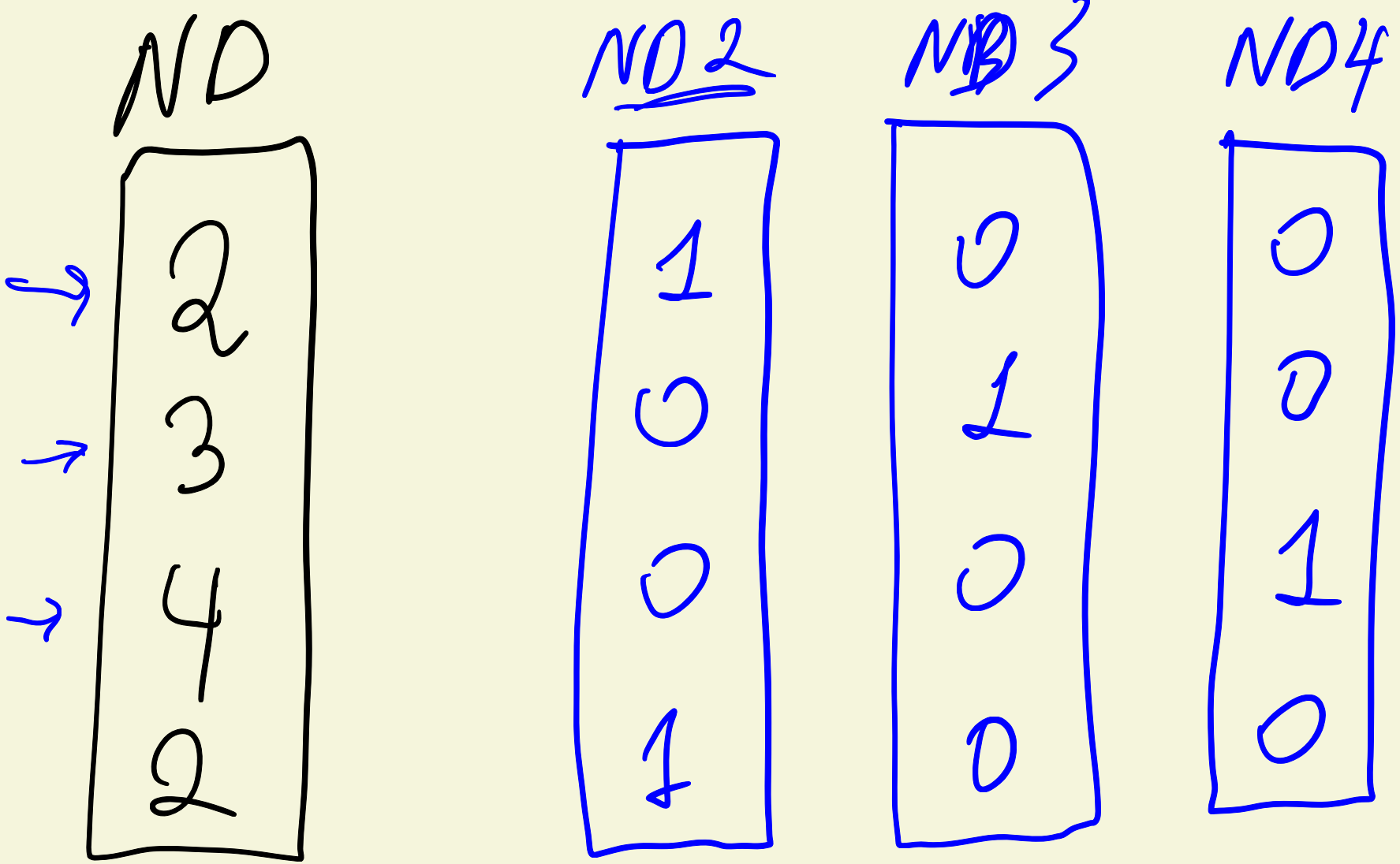
SQUARED ERROR → 1 0 0,25 2,25

MEAN SE → $\frac{1+0+0.25+2.25}{4} =$

$= 0.875$

$\sqrt{0.875} = 0.93$

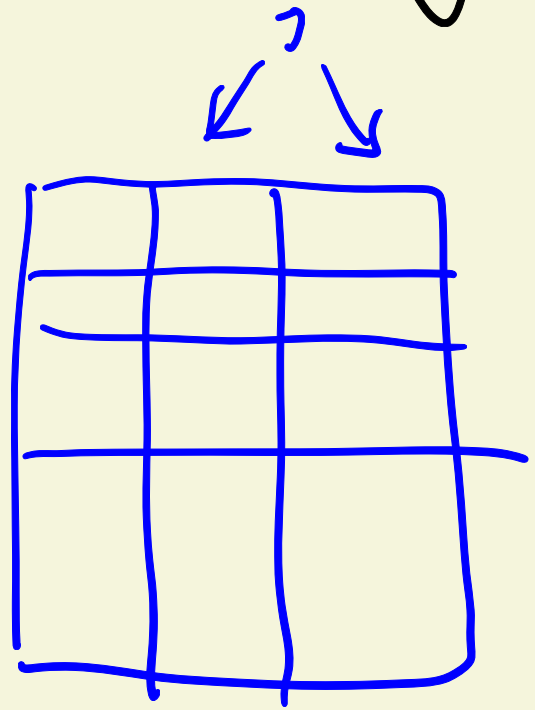

TRAIN
VAL
TEST
g
RMSE

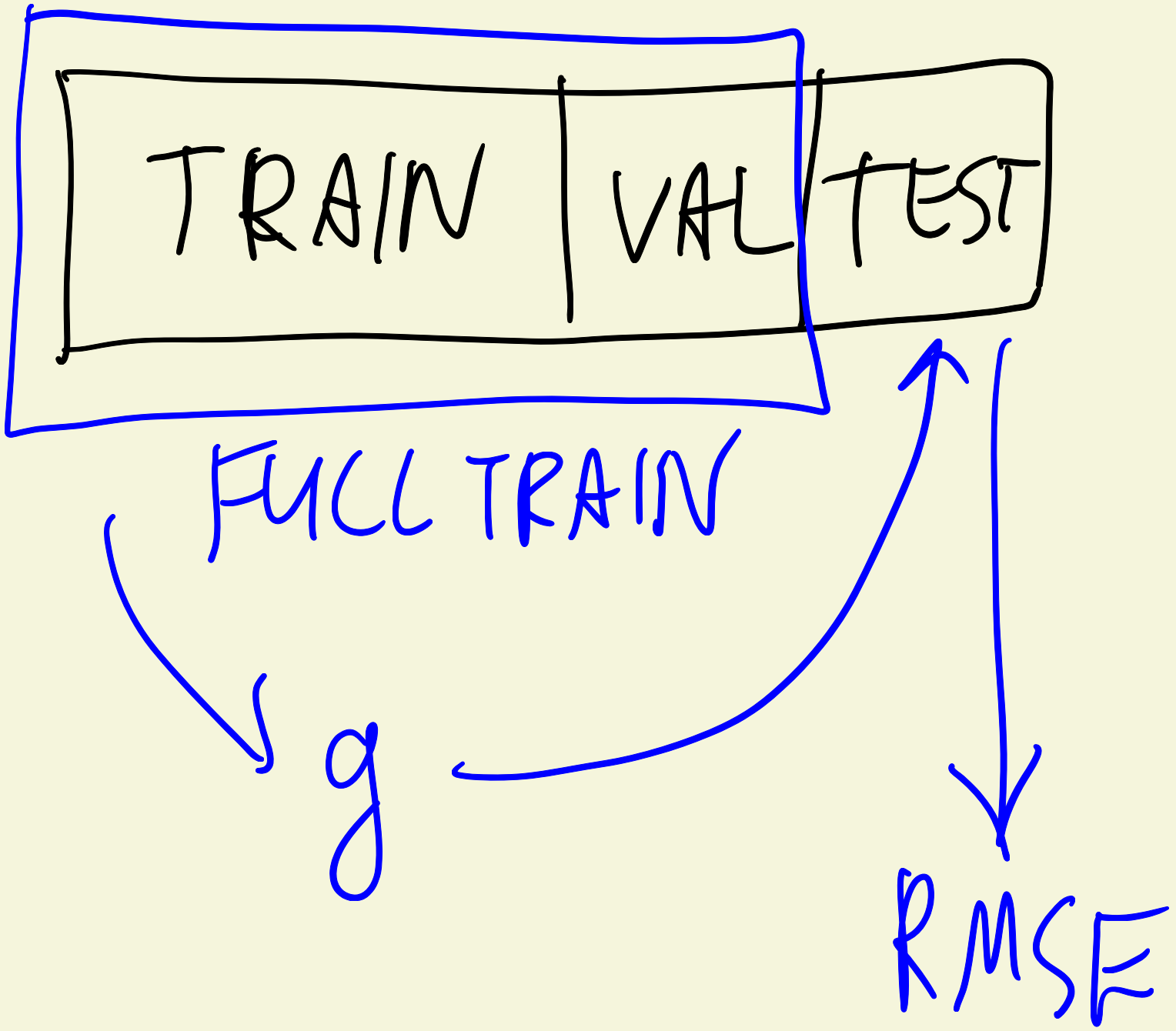

ND
ND2
ND3
ND4
2
3
4
2
1
0
0
1
0
1
0
1
0
1
0

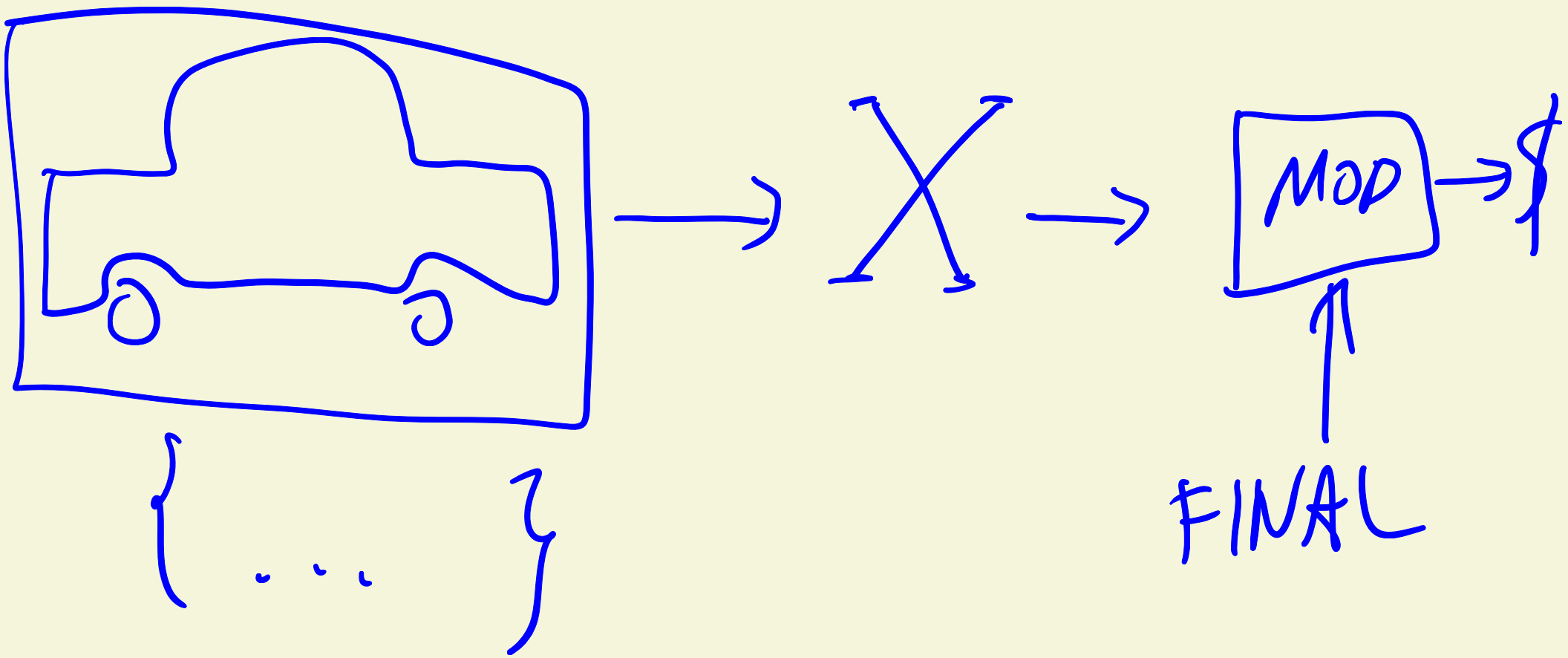
$$w = (X^T X)^{-1} \cdot X^T \cdot y$$

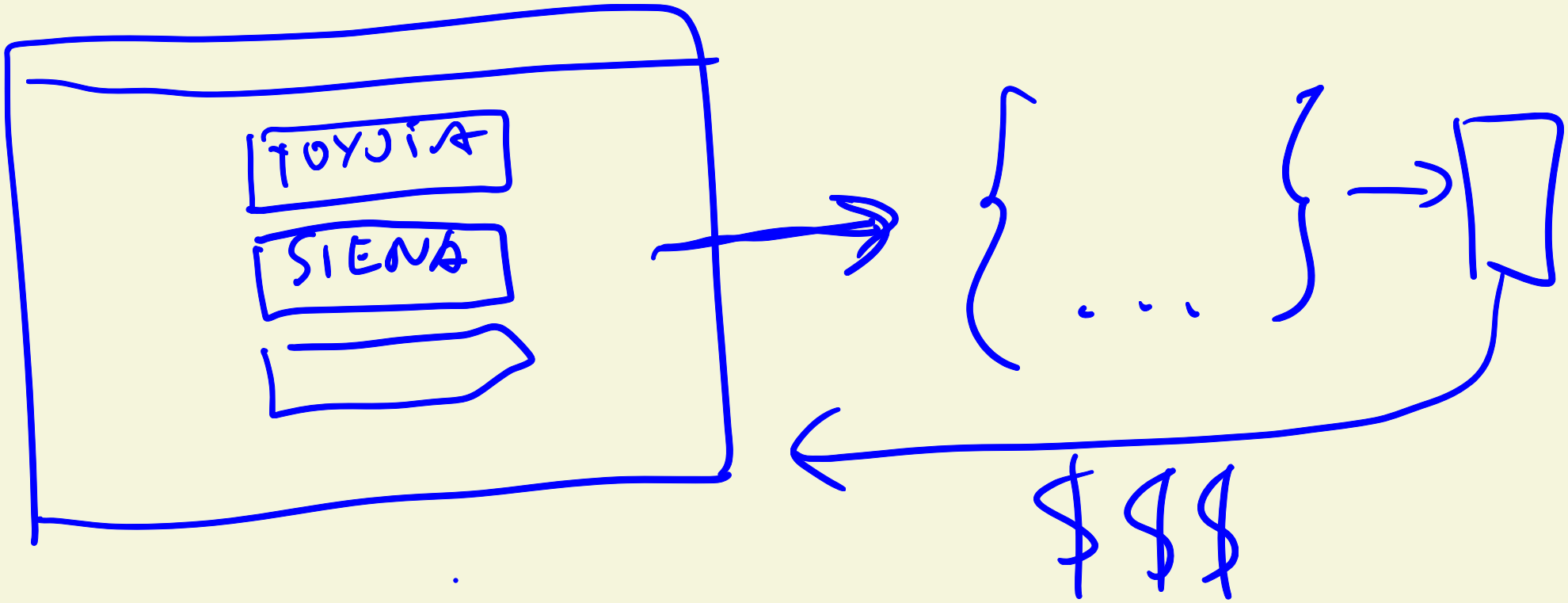
$X^T X$

$X =$




TRAIN
VAL
TEST
FULL TRAIN
g
RMSE


MOD
FINAL


TOYOTA
SIENA
$$$