

BIG QUESTION:

SUPPOSE $Ax = b$ HAS NO SOLUTION.

GOAL FIND AN x THAT IS CLOSEST TO SOLVING THIS EQUATION.

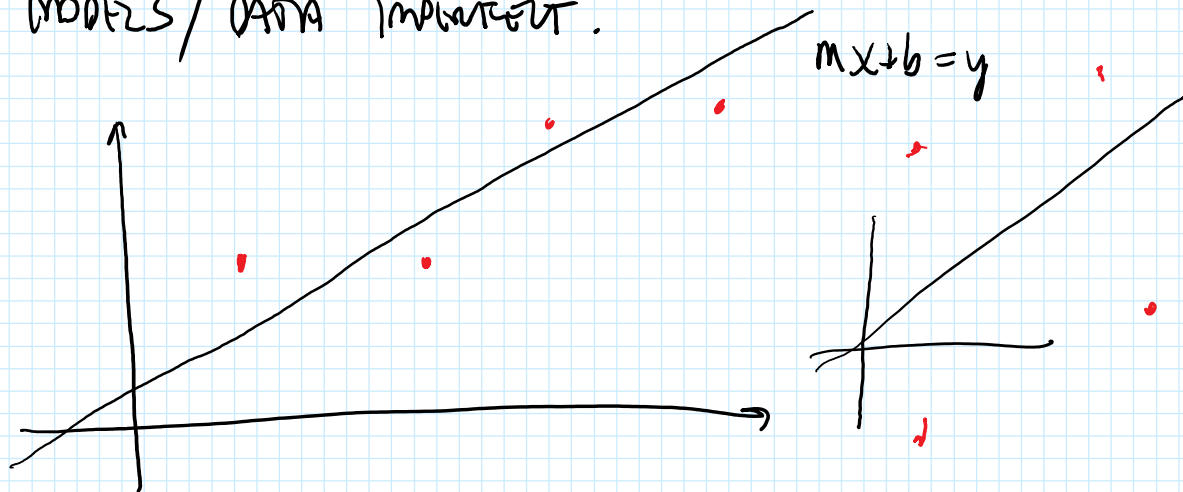
I.E. $Ax = \hat{b}$ ←

AND $b - \hat{b}$ IS AS SMALL AS POSSIBLE.

ERROR = $b - \hat{b}$ ← $|b - \hat{b}| = 17.0001$

WFM: MODELS / DATA IMPERFECT.

EX:

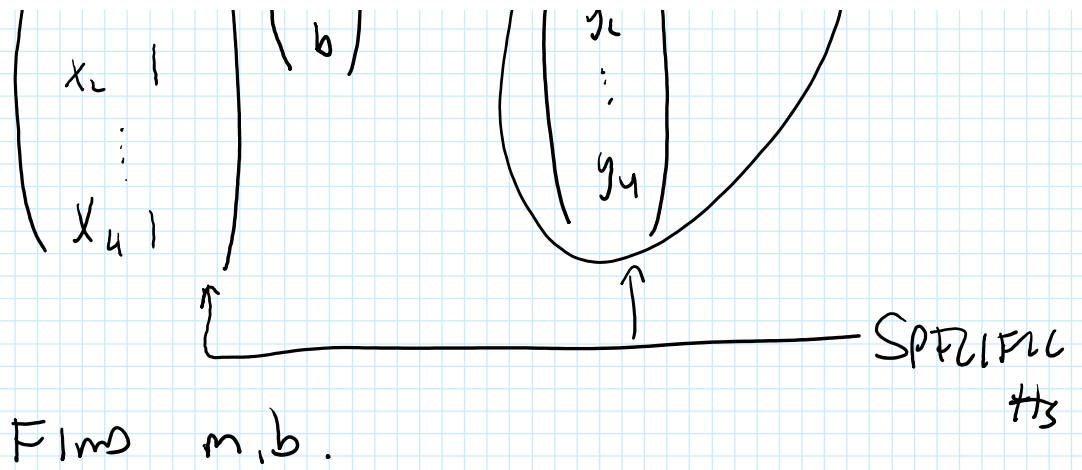


(x_1, y_1) (x_2, y_2) ... (x_n, y_n)

FIT A LINE TO THIS DATA.

$$Ax = b$$

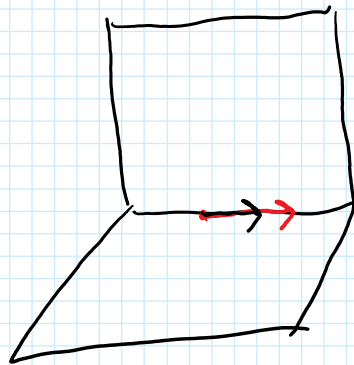
$$\begin{pmatrix} x_1 \\ \vdots \\ x_n \end{pmatrix} = \begin{pmatrix} m \\ b \end{pmatrix} = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \end{pmatrix}$$



(1) THIS MEAN:

- Row space $A \perp$ Nullspace of A
- Col space $A \perp$ Nullspace of A^T

Q: WHAT DOES IT MEAN FOR V.S.
TO BE \perp ?



DEF: $V \perp W$

IF

$v \perp w$

$\forall v \in V \ \& \ w \in W$

EX: xy-axis

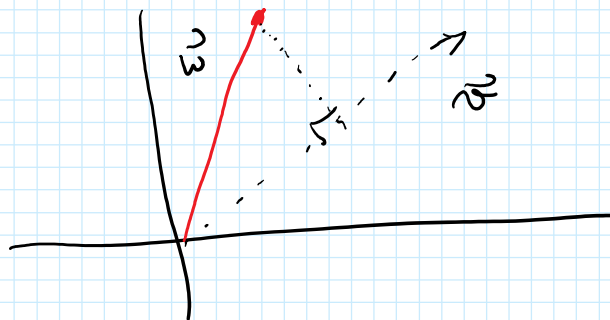
& z-axis,

(2) PROJECTIONS.

(1) \hat{b} will be a proj. of b

(2) PROJECTIONS IN PASTA SUBSPACE.

FLASHBACK TO 180:



QWA: COME INTO FORMULA
USING MATRICES.