

$$\min_x \|Ax - b\|_2$$

full QR: orthogonal
 $A = QR$

$$\|Qx\|_2 = \|x\|_2$$

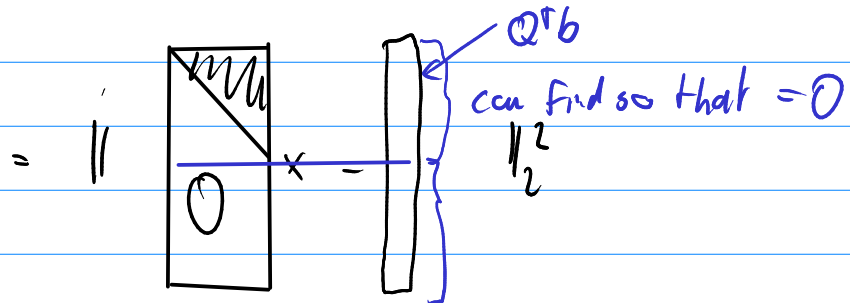
residual

$$\|Ax - b\|_2^2 = \|QRx - b\|_2^2$$

$$= \|Q^T(QR - b)\|_2^2$$

Q^T : also orthogonal

$$= \|\cancel{Q}^T Q R x - Q^T b\|_2^2$$



Find x of.

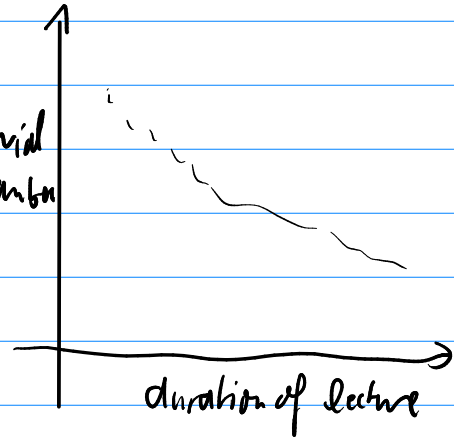
$$R_{upper} x = (Q^T b)_{upper}$$

Data Fitting

Have

(x_i, y_i)

material
remem br



Have Idea for a model

$$y \approx ax + b$$

don't know

$$ax_1 + b = y_1$$

$$ax_2 + b = y_2$$

⋮

$$ax_n + b = y_n$$

$$\leadsto \begin{pmatrix} x_1 & 1 \\ x_2 & 1 \\ \vdots & \vdots \\ x_n & 1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} y_1 \\ \vdots \\ y_n \end{pmatrix}$$

linear regression