a system of equations is considered overdetermined if there are more equations than unknowns.

overdetermined least-squares problem:

$$\underbrace{\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_m \end{bmatrix}}_{b\ m\times 1} = \underbrace{\begin{bmatrix} 1 & t_1 \\ 1 & t_2 \\ \vdots & \vdots \\ 1 & t_m \end{bmatrix}}_{A\ m\times n} \underbrace{\begin{bmatrix} x_0 \\ x_1 \end{bmatrix}}_{x\ n\times 1}$$

$m>n$

$$Ax \cong b.$$

① nomal Solve $\underbrace{A^TA}_{n\times n}\ \underbrace{x}_{n\times 1} = \underbrace{A^Tb}_{n\times 1}$.

② SVD $A = U\Sigma V^T$, $A^+ = V\Sigma^+U^T$

$x = A^+ b$ 伪逆

$\Sigma^+ = \begin{bmatrix} \frac{1}{\sigma_1} & \frac{1}{\sigma_2} & \cdots & \frac{1}{\sigma_n} \end{bmatrix}_{n\times m}$

~~③ LU~~ Cholesky ✗ $m>n$. not square.