

HW 6 P1

QR : $A = QR$

$$Ax = b$$

$$QRx = b$$

$$Rx = Q^T b$$

$$x = R^{-1} Q^T b$$

$$A^T Ax = A^T b$$

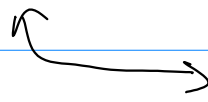
$$(QR)^T (QR)x = (QR)^T b$$

$$R^T Q^T Q R x = R^T Q^T b$$

$$R^T R x = R^T Q^T b$$

$$R x = Q^T b \quad (\text{as } R^{-T} \text{ exists})$$

$$x = R^{-1} Q^T b$$



SVD : $A = U \Sigma V^T$

$$Ax = b$$

$$U \Sigma V^T x = b$$

$$\Sigma V^T x = U^T b$$

$$V^T x = \Sigma^{-1} U^T b$$

$$x = V \Sigma^{-1} U^T b$$

$$A^T Ax = A^T b$$

$$(U \Sigma V^T)^T (U \Sigma V^T) x = (U \Sigma V^T)^T b$$

$$V \Sigma^T U^T U \Sigma V^T x = V \Sigma^T U^T b$$

$$V \Sigma^T \Sigma V^T x = V \Sigma^T U^T b$$

$$V \Sigma^2 V^T x = V \Sigma U^T b$$

$$\Sigma^2 V^T x = \Sigma U^T b$$

$$V^T x = \Sigma^{-1} U^T b$$

$$x = V \Sigma^{-1} U^T b$$

