

RIFLESSIONI di HOUSEHOLDER

ESEMPIO:

$$X = \begin{pmatrix} 3 \\ 1 \\ 5 \\ 1 \end{pmatrix} \xrightarrow{u} \begin{pmatrix} \sigma \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$\sigma = \|X\|_2 = \sqrt{3^2 + 1^2 + 5^2 + 1^2} = \sqrt{36} = 6$$

$$U = I - 2 \frac{u^T u}{\|u\|^2}$$

$$u = X \pm 6e_1 = \begin{pmatrix} 9 \\ 1 \\ 5 \\ 1 \end{pmatrix}$$

quanto vale $\|u\|^2$?

$$\sqrt{9^2 + 1^2 + 5^2 + 1^2} \neq 36$$

$$U = \begin{bmatrix} 1 & & & \\ & 1 & & \\ & & 1 & \\ & & & 1 \end{bmatrix} - 2 \cdot \frac{\begin{bmatrix} 81 & 9 & 45 & 9 \\ 9 & 1 & 5 & 1 \\ 45 & 5 & 25 & 5 \\ 9 & 1 & 5 & 1 \end{bmatrix}}{36}$$

$$= \begin{bmatrix} 1 & & & \\ & 1 & & \\ & & 1 & \\ & & & 1 \end{bmatrix} - \frac{1}{18} \begin{bmatrix} 81 & 9 & 45 & 9 \\ 9 & 1 & 5 & 1 \\ 45 & 5 & 25 & 5 \\ 9 & 1 & 5 & 1 \end{bmatrix}$$

