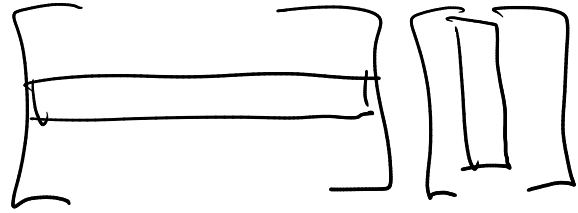


1.5.8 P Householder matrix, $\tilde{P}b$ (not $O(n^2)$)



n operations, n times MVP

$$P = I_n - \frac{2}{\langle \tilde{v}, \tilde{v} \rangle} \tilde{v} \tilde{v}^*$$

$$\left(I_n - \frac{2}{\langle \tilde{v}, \tilde{v} \rangle} \tilde{v} \tilde{v}^* \right) \tilde{b} = I_n \tilde{b} - \frac{2}{\langle \tilde{v}, \tilde{v} \rangle} \tilde{v} \tilde{v}^* \tilde{b}$$

outer product
 n^2 operations

$$= \tilde{b} - \frac{2 \tilde{v} \tilde{v}^* \tilde{b}}{\langle \tilde{v}, \tilde{v} \rangle}$$

inner product, scalar

$$= \tilde{b} - \frac{2 \langle \tilde{v}, \tilde{b} \rangle}{\langle \tilde{v}, \tilde{v} \rangle} \tilde{v}$$

Scalar

$O(4n)$

Problem 24 (c)

columns from . eigen matrix - vjkt ()

$$\mathcal{E}_{A^*A}(0) = \langle \{ \underline{v}_1, \underline{v}_2, \dots, \underline{v}_k \} \rangle$$

$$A = [\underline{v}_1 \mid \underline{v}_2 \mid \dots \mid \underline{v}_k]$$

$$= \underline{QR} \leftarrow \text{the } C(A) = C(Q)$$

columns orthonormal set

A. transpose () . gram - schmidt ()

$$\underline{y}_i = \frac{1}{\sqrt{\delta_i}} A \underline{x}_i$$