$$\|X\|_2 = \|y\|_2 = 1 \quad , \quad \text{Encontrar } Q \text{ Householder } t_2 \ Qx = y$$

$$Q = I - \frac{2}{\|v\|_2^2} v v^t . \quad \boxed{\text{Usemos } v = x - y}$$

$$Qx = \left(I - \frac{2}{\|x-y\|_2^2} (x-y)(x-y)^t \right) x = x - \frac{2}{\|x-y\|_2^2} (x-y)(x-y)^t x =$$

$$\boxed{\begin{array}{l} x = \frac{(x+y)}{2} + \frac{(x-y)}{2} \\[2mm] (x-y)^t (x+y) = \|x\|_2^2 + x^t y \\ \qquad -y^t x - \|y\|_2^2 \\ \qquad = 0 \end{array}}$$

$$= x - \frac{2}{\|x-y\|_2^2} (x-y) \underbrace{(x-y)^t \frac{(x+y)}{2}}_{=0} - \frac{2}{\|x-y\|_2^2} (x-y) \underbrace{(x-y)^t \frac{(x-y)}{2}}_{\overset{\|x-y\|_2^2}{=}} =$$

$$= x - (x-y) = y$$