1. $x = [1.1,\ 2.2,\ 3.3,\ 1]^T$

2. $w^T x = 4.4 > 0$. So it's $+1$ class

3. $x_i'' = x_i y_i$, $y_i'' = y_i y_i = 1$

We know $J(w)$ for x_i is

$$J(w) = \sum_{i=1}^{N} (x_i^T w - y_i)^2$$

$$= \sum_{i=1}^{N} (x_i^T w - y_i)^2 y_i^2$$

$$= \sum_{i=1}^{N} (x_i''^T w - 1)^2$$

4. $$\frac{\partial J(w)}{\partial w} = 0 = 2 \sum_{i=1}^{N} x_i'' (x_i''^T w - 1)$$

$$\Rightarrow \sum_{i=1}^{N} x_i'' x_i''^T w = \sum_{i=1}^{N} x_i''$$

We set $$X'' = \begin{pmatrix} x_1''^T \\ x_2''^T \\ \vdots \\ x_N''^T \end{pmatrix} \qquad y'' = \begin{pmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{pmatrix}$$

$$\Rightarrow X''^T X'' w = X'' y''$$

$$\Rightarrow w = (X''^T X'')^{-1} X'' y''$$