$$J(w,b) = \frac{1}{4}\sum_{x\in X}(x^T w + b - f^*(x))^2$$

$$\frac{\partial J(w,b)}{\partial w} = \frac{1}{4}\cdot 2\sum_{x\in X} x(x^T w + b - f^*(x))$$

$$= \frac{1}{2}\left[\left(\sum xx^T\right)w + \left(\sum x\right)b - \sum x f^*(x)\right]$$

$$\frac{\partial J(w,b)}{\partial b} = \frac{1}{2}\sum(x^T w + b - f^*(x))$$

$$= \frac{1}{2}\left[\left(\sum x^T\right)w + 4b - \sum f^*(x)\right] = 0 \quad (2)$$

$$(2)*\sum_{x\in X} x \Rightarrow \frac{1}{2}\left[\left(\sum x\sum x^T\right)w + 4\left(\sum x\right)b - \sum x\sum f^*(x)\right] = 0 \quad (3)$$

$$(3)-4(1) \Rightarrow \frac{1}{2}\left(\sum xx^T - \frac{1}{4}\sum x\sum x^T\right)w = 0$$

$$\therefore w = \frac{\sum x\sum f^*(x) - 4\sum xf^*(x)}{\sum x\sum x^T - 4\sum xx^T}$$

$$\sum xf^*(x) = \left(\begin{bmatrix}0\\0\end{bmatrix}+\begin{bmatrix}0\\1\end{bmatrix}+\begin{bmatrix}1\\0\end{bmatrix}+\begin{bmatrix}1\\1\end{bmatrix}\right)(0+1+1+0)$$

$$= 2\begin{bmatrix}2\\2\end{bmatrix}$$

$$\sum xf^*(x) = 0*\begin{bmatrix}0\\0\end{bmatrix} + 1*\begin{bmatrix}0\\1\end{bmatrix} + 1*\begin{bmatrix}1\\0\end{bmatrix} + 2*\begin{bmatrix}1\\1\end{bmatrix} = \begin{bmatrix}3\\3\end{bmatrix}$$

$$\therefore \sum x\sum f^*(x) - 4\sum xf^*(x) = 2\begin{bmatrix}2\\2\end{bmatrix} - 4\begin{bmatrix}1\\1\end{bmatrix} = 0$$

$$\therefore w = 0$$

$$b = \frac{1}{4}\left[\sum f^*(x) - \sum x^T w\right] = \frac{1}{4}[(0+1+1+0) - 0] = 0.5$$