5) Given $S = \{(\vec{x}_1, y_1), \cdots, (\vec{x}_m, y_m)\}$

The loss function of logistic regression is

$$L_{l_2}(h_w, S) = \sum_{i=1}^{m} (h_w(\vec{x}_i) - y_i)^2 + \lambda \|w\|_2^2$$

show Solution is $w = (A + \lambda I)^{-1} b$ when $A + \lambda I$ is invertible

where $A = \sum_{i=1}^{m} \vec{x}_i \vec{x}_i^T$ and $b = \sum_{i=1}^{m} y_i \vec{x}_i$

$$L_{l_2}(h_w, S) = \sum_{i=1}^{m} h_w(\vec{x}_i)^2 - 2h_w(\vec{x}_i)(y_i) + y_i^2 + \lambda\|w$$

$$= \sum_{i=1}^{m} h_w(\vec{x}_i)^2 - 2\sum_{i=1}^{m} h_w(\vec{x}_i) \cdot y_i + \sum_{i=1}^{m} y_i^2 + \lambda\|w$$

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