Milestone 1   W: $[0, 0, 0, 0, 0, 0]$ $\alpha = 0.5$
(pretty, good, bad, plot, not, scenery)

① (0) pretty bad $y_1 = 0$

$\phi(X_1) = [1, 0, 1, 0, 0, 0]$

$h_1 = \sigma(W \cdot \phi(X_1)) = \sigma(0) = \dfrac{1}{1 + \bar{e}^0} = 0.5$

$W = W - \alpha \dfrac{\partial L}{\partial W}$

$\quad = W - \alpha(h_1 - y_1) \phi(X_1)$

$\quad = [0, 0, 0, 0, 0, 0] - 0.5(0.5 - 0)[1, 0, 1, 0, 0, 0]$

$\quad = [-0.25, 0, -0.25, 0, 0, 0]$

② (1) good plot $y_2 = 1$

$\phi(X_2) = [0, 1, 0, 1, 0, 0]$

$h_2 = \sigma(W \cdot \phi(X_2)) = \sigma(0) = \dfrac{1}{1 + \bar{e}^0} = 0.5$

$W = W - \alpha \dfrac{\partial L}{\partial W}$

$\quad = W - \alpha(h_2 - y_2) \phi(X_2)$

$\quad = [-0.25, 0, -0.25, 0, 0, 0] - 0.5(0.5 - 1)[0, 1, 0, 1, 0, 0]$

$\quad = [-0.25, 0.25, -0.25, 0.25, 0, 0]$

③ (0) not good $y_3 = 0$

$\phi(X_3) = [0, 1, 0, 0, 1, 0]$

$h_3 = \sigma(W \cdot \phi(X_3)) = \sigma(0.25) = \dfrac{1}{1 + e^{-(0.25)}} = 0.5621765$

$W = W - \alpha \dfrac{\partial L}{\partial W}$

$\quad = W - \alpha(h_3 - y_3)\phi(X_3)$

$\quad = [-0.25, 0.25, -0.25, 0.25, 0, 0]$

$\qquad - 0.5(0.5621765 - 0)[0, 1, 0, 0, 1, 0]$

$\quad = [-0.25, -0.081088, -0.25, 0.25, -0.281088, 0]$

④ (1) pretty scenery $y_4 = 1$

$\phi(X_4) = [1, 0, 0, 0, 0, 1]$

$h_4 = \sigma(W \cdot \phi(X_4)) = \sigma(-0.25) = \dfrac{1}{1 + e^{-(-0.25)}} = 0.4378$

$W = W - \alpha \dfrac{\partial L}{\partial W}$

$\quad = W - \alpha(h_4 - y_4)\phi(X_4)$

$\quad = [-0.25, -0.081088, -0.25, 0.25, -0.281088, 0]$

$\qquad - 0.5(0.4378 - 1)[1, 0, 0, 0, 0, 1]$

$\quad = [0.031088, -0.081088, -0.25, 0.25, -0.281088, 0.281088]$