

$$MSE = \frac{(0.7)^2 + (0.9)^2}{2} = \underline{0.65}$$

②  $m = 0.8, b = 0.5$

$$y_1 = 0.8(1) + 0.5 = 1.3$$

$$y_2 = 0.8(2) + 0.5 = 2.1$$

$$\text{Error} = y_i - \hat{y}_i$$

$$\text{Error}_1 = 2 - 1.3 = 0.7$$

$$\text{Error}_2 = 3 - 2.1 = 0.9$$

Gradients

$$\begin{aligned}\frac{\partial J}{\partial m} &= -\frac{2}{2}(1*0.7 + 2*0.9) \\ &= -1(0.7 + 1.8) \\ &= \underline{-2.5}\end{aligned}\quad \begin{aligned}\frac{\partial J}{\partial b} &= -\frac{2}{2}(0.7 + 0.9) \\ &= -1(1.6) \\ &= \underline{-1.6}\end{aligned}$$

Update  $m$  &  $b$ :

$$\begin{aligned}m_{\text{new}} &= 0.8 - 0.1(-2.5) \\ &= 0.8 + 0.25 \\ &= \underline{1.05}\end{aligned}$$

$$\begin{aligned}b_{\text{new}} &= 0.5 - 0.1(-1.6) \\ &= 0.5 + 0.16 \\ &= \underline{0.66}\end{aligned}$$

$\hat{y}$ -predicted:

$$\begin{aligned}\hat{y}_1 &= 1.05(1) + 0.66 \\ &= \underline{1.71}\end{aligned}$$

$$\begin{aligned}\hat{y}_2 &= 1.05(2) + 0.66 \\ &= \underline{2.76}\end{aligned}$$

$$\text{Error} = y_i - \hat{y}_i$$

$$\text{Error}_1 = 2 - 1.71 = 0.29$$

$$\text{Error}_2 = 3 - 2.76 = 0.24$$

$$MSE = \frac{(0.29)^2 + (0.24)^2}{2} = \underline{0.07085}$$