Iteration 3 (given: $m_2 = 1.26$, $b_2 = 1.9$)

Predictions:

- $\hat{y}_1 = 3.16$, $e_1 = -0.16$
- $\hat{y}_2 = 5.68$, $e_2 = 0.32$

Gradients:

$$\sum x_i e_i = 1 \times (-0.16) + 3 \times (0.32) = -0.16 + 0.96$$
$$= 0.80$$

So $\frac{\partial J}{\partial m} = -1 \times 0.80 = 0.80$

$$\sum e_i = -0.16 + 0.32 = 0.16$$

So $\frac{\partial J}{\partial b} = -1 \times 0.16 = -0.16$

Update Parameters:

$$\therefore m_3 = 1.26 - 0.1 \times (-0.80) = 1.26 + 0.08 = 1.34$$

$$\therefore b_3 = 1.9 - 0.1 \times (-0.16) = 1.9 + 0.016 = 1.916$$

Predictions & MSE after update (Given $m_3 = 1.34$, $b_3 = 1.916$):

$\hat{y}_1 = 1.34 \times 1 + 1.916 = 1.34 + 1.916 = 3.256$

Error: $3 - 3.256 = -0.256$ //

$\hat{y}_2 = 1.34 \times 3 + 1.916 = 4.02 + 1.916 = 5.936$

Error: $6 - 5.936 = 0.064$ //

∴ MSE after iter 3:

$$MSE_3 = \frac{(-0.256)^2 + (0.064)^2}{2} =$$

$$= \frac{0.065536 + 0.004096}{2}$$

$$= \frac{0.069632}{2} = 0.034816$$