Given:

linear equation: $y = mx + b$

$m = 1.7 \quad b = 2.1 \quad \alpha = 0.1$

$(1,3) \quad (3,6)$

$p = 2$

gradiant formula.

$$\frac{dJ}{dm} = -\frac{2}{n} \sum (y_i - \hat{y}_i) x_i$$

$$\frac{dJ}{db} = \frac{-2}{n} \sum (y_i - \hat{y}_i)$$

$$m_{new} = m_{old} - \alpha \left(\frac{dJ}{dm}\right)$$

$$b_{new} = b_{old} - \alpha \left(\frac{dJ}{db}\right)$$

1) predictions $(\hat{y}_i)$, $(1,3) \quad (3,6)$

$y = mx + b$

$\hat{y}_1 = 1.7(1) + 2.1$, $\hat{y}_1 = 3.8$

$\hat{y}_2 = 1.7(3) + 2.1$ $\hat{y}_2 = 7.2$

2. Gradients

$\frac{\partial J}{\partial m} = \frac{-2}{n} \sum (y_i - \hat{y}_i) x_i$ where $n = 2$

$y_1 = 3$

$y_2 = 6$

$\hat{y}_1 = 3$

$\hat{y}_2 = 7$

$= \frac{-2}{2} [(3-3.8)(1) + (6-7.2)(3)]$

$= -1 [(-0.8) + (-3.6)]$

$x_1 = 1$

$x_2 = 3$

$= (-1(-4.4) = 4.4$

$\frac{\partial J}{\partial b} = \frac{-2}{n} \sum (y_i - \hat{y}_i)$

$= -2/2 [(3-3.8) + (6-7.2)]$

$= -1((-0.8) + (-1.2))$

$= -1(-2) = 2.$

3. Updating parameters, where $m_{old} = 1.7$

$b_{old} = 2.1$

$$m_{new} = m_{old} - \alpha \frac{\partial J}{\partial m}$$

$$b_{new} = b_{old} - \alpha \frac{\partial J}{\partial b}$$

$\alpha = 0.1$

$\frac{\partial J}{\partial m} = 4.4$

$\frac{\partial J}{\partial b} = 2$

$\rightarrow m_{new} = 1.7 - 0.1(4.4)$

$= 1.26$

$b_{new} = 2.1 - 0.1(2)$

$= 1.9$

$m_{new} = 1.26$, $b_{new} = 1.9$