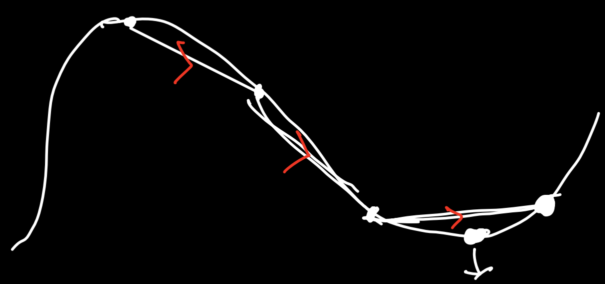
$y = 6x^2 + 2x - 10 \longrightarrow \downarrow y$

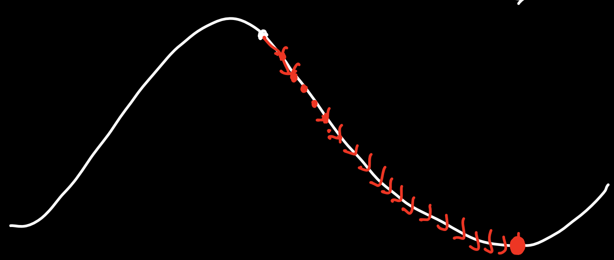
What is the value of x where f(x) is minimal?

$\text{der}(y) = \frac{dy}{dx} = 12x + 2 \longrightarrow$ direction

$\text{der}(5) = 12(5) + 2 = 62 \longrightarrow$ direction

steps → learning rate → 0.001 → 0.01





Current_x = 5

learning rate = 0.01

Previous_x = current

Current_x = Current_x − der(Current_x) * learning_rate → loop

Change : Previous_x − current_x

Change is very minimal → Stop the iteration

$$\boxed{MSE = \frac{1}{n} \Sigma (y - \hat{y})^2}$$

$$= \frac{1}{n} \Sigma (y^2 + \hat{y}^2 - 2y\hat{y})$$

$$= \frac{1}{n} \Sigma (y^2 + (mx+b)^2 - 2y(mx+b))$$

$$= \frac{1}{n} \Sigma (y^2 + m^2x^2 + b^2 + 2mxb - 2ymx - 2yb)$$

$$\frac{\partial}{\partial m} = \frac{1}{n} \Sigma (0 + 2mx^2 + 0 + 2xb - 2yx - 0)$$

$$= \frac{1}{n} \Sigma (2mx^2 + 2xb - 2yx)$$

$$= \frac{2}{n} \sum_1^n (mx^2 + xb - yx)$$

$$\frac{\partial}{\partial m} = \frac{2}{n} \sum_1^n (-x(y - (mx+b)))$$

$$= \frac{1}{n} \Sigma (y^2 + m^2x^2 + \underline{b^2} + \underline{2mxb} - 2ymx - 2yb)$$

$$\frac{\partial}{\partial b} = \frac{1}{n} \Sigma \left(0 + 0 + 2b + 2mx - 0 - 2y\right)$$

$$= \frac{1}{n} \Sigma \left(2b + 2mx - 2y\right)$$

$$= \frac{2}{n} \Sigma \left(b + mx - y\right)$$

$$\frac{\partial}{\partial b} = \frac{2}{n} \Sigma -\left(y - (mx + b)\right)$$

$$\boxed{\begin{aligned} \frac{\partial}{\partial m} &= \frac{2}{n} \sum_{i=1}^{n} \left(-x\left(y - (mx + b)\right)\right) \\ \frac{\partial}{\partial b} &= \frac{2}{n} \Sigma -\left(y - (mx + b)\right) \end{aligned}}$$