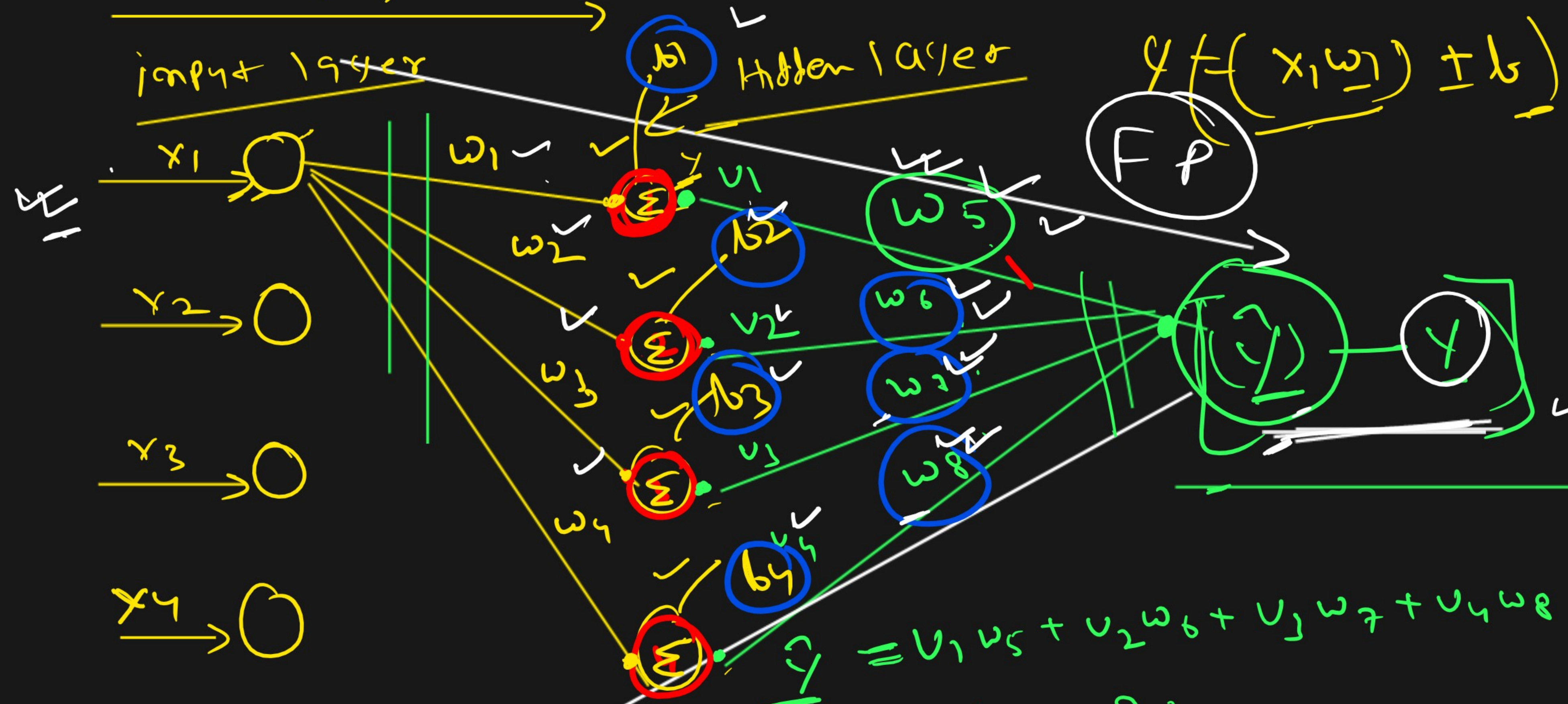
Neural Network

[1, 0, 1, 2, 1, 2,]



$y = (x_1 w_1) + b$

X	Y
5	10
20	40
18	35
17	32

$= (y = \hat{2}x) + b$

1.2

$34 - 2$

$\hat{y} = v_1 w_5 + v_2 w_6 + v_3 w_7 + v_4 w_8$

$(y - \hat{y})$

$z_1 = (x_1 w_1 + b_1)$

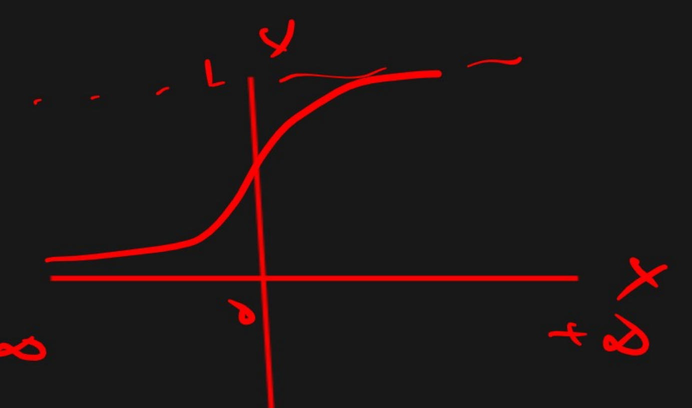
$z_2 = (x_1 w_2 + b_2)$

$z_3 = (x_1 w_3 + b_3)$

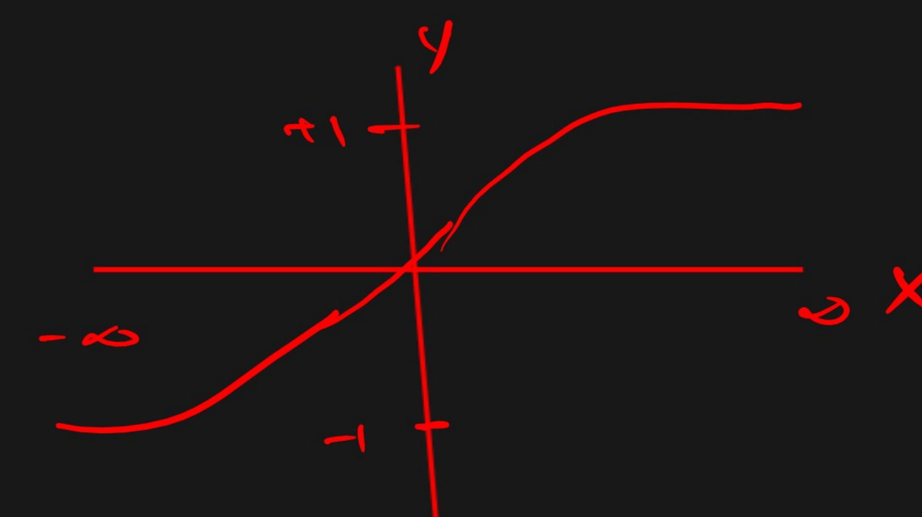
$(x_1 w_4 + b_4)$

$\sigma = \left(\dfrac{1}{1 + e^{-z}}\right)$ $\quad -\infty < x < \infty$

$[0 - 1]$

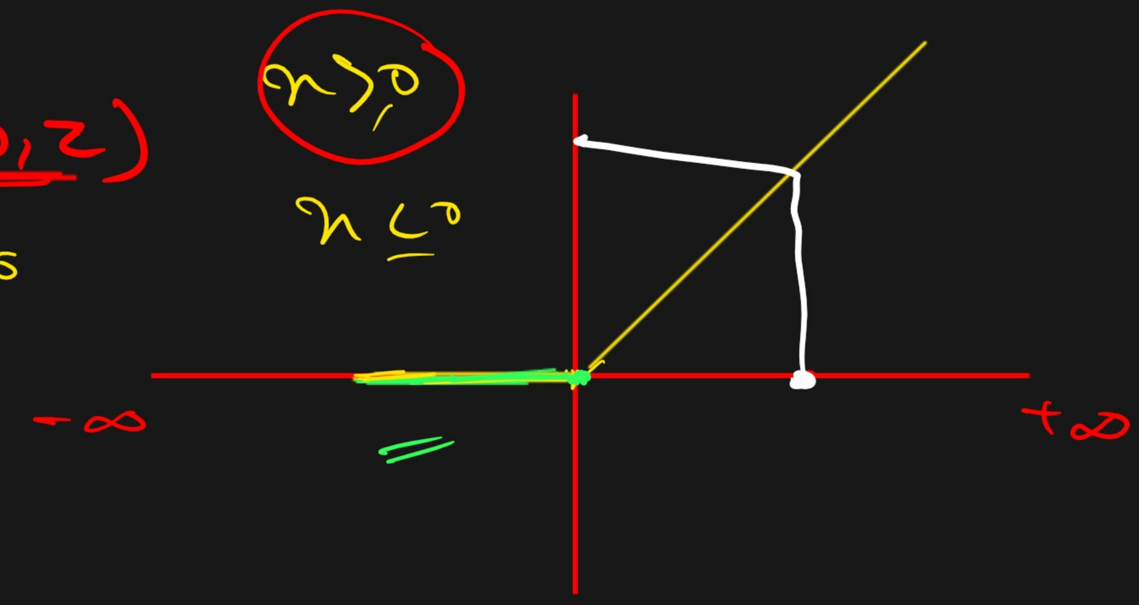


$f(\tanh) = \left(\dfrac{e^{z} - e^{-z}}{e^{z} + e^{-z}}\right)$



$f(\text{ReLU}) = \max(0, z)$

$y = mx + c$



$$\left[\left(\mathrm{ReLU}(x_1, w_1)\cdot w_5\right) + \quad \right]$$

$$\left(\frac{1}{1+e^{-z}}\right) = (0, 1)$$

$$\tanh = (-1, +1)$$

$$w_n = w_o - \eta\left(\frac{\partial L}{\partial w_o}\right)$$

$$1 - \eta$$

$$b_n = \left(b_o - \eta\frac{\partial L}{\partial b_o}\right)$$

$$\hat{y} = 5.4$$

$$y = 10$$

$$(y - \hat{y}) = [(10 - 5.4)] = 4.6$$

$$= \left(\frac{1}{n}\sum(y - \hat{y})^2\right) =$$

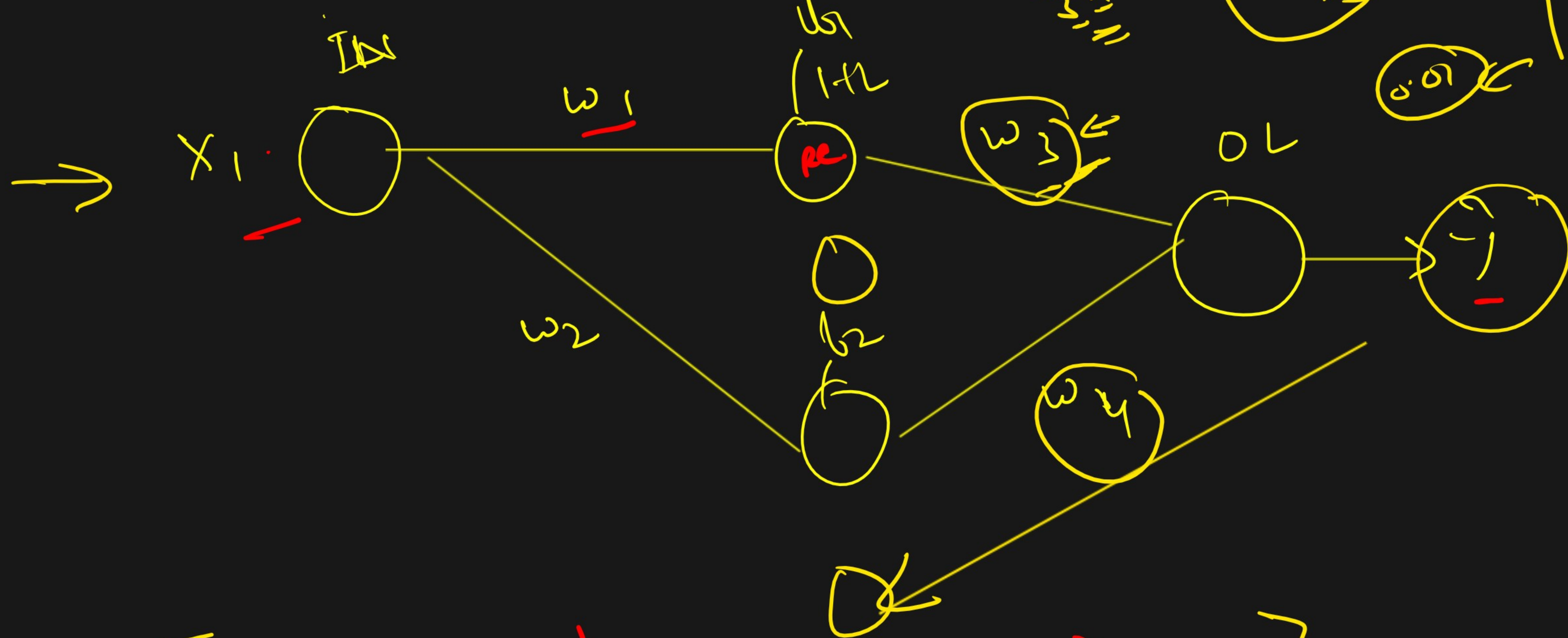
$$w_n = w_o - \eta \left(\frac{\partial L}{\partial w}\right)$$

$$L = \frac{1}{N} \sum_{i=1}^{N} \left(y - \hat{y} \right)^2$$

$$= \frac{1}{N} \sum_{i=1}^{N} \left(y - \right.$$

$$w_{3n} = w_{0,3} - \eta\left(\frac{\partial L}{\partial w_3}\right)$$

0.01



$$\hat{y} = \left[\mathrm{Reu}(x_1 w_1 + b_1)\cdot w_3 + \mathrm{Reu}(x_1 w_2 + b_2)\cdot w_4\right]$$

$$\hat{y} = \left(\mathrm{ReLu}(x_1 w_1 + b_1)\right)\cdot w_3 + \left(\mathrm{ReLu}(x_1 w_2 + b_2)\right) w_4$$

$$\hat{y} = (x_1 w_1 + b_1) w_3 + (x_1 w_2 + b_2)\cdot w_4$$

$$(y - \hat{y}) = L$$

$$MSE = \frac{1}{N}\sum_{i=1}^{n}(y - \hat{y})^2$$

$$y = x^n$$

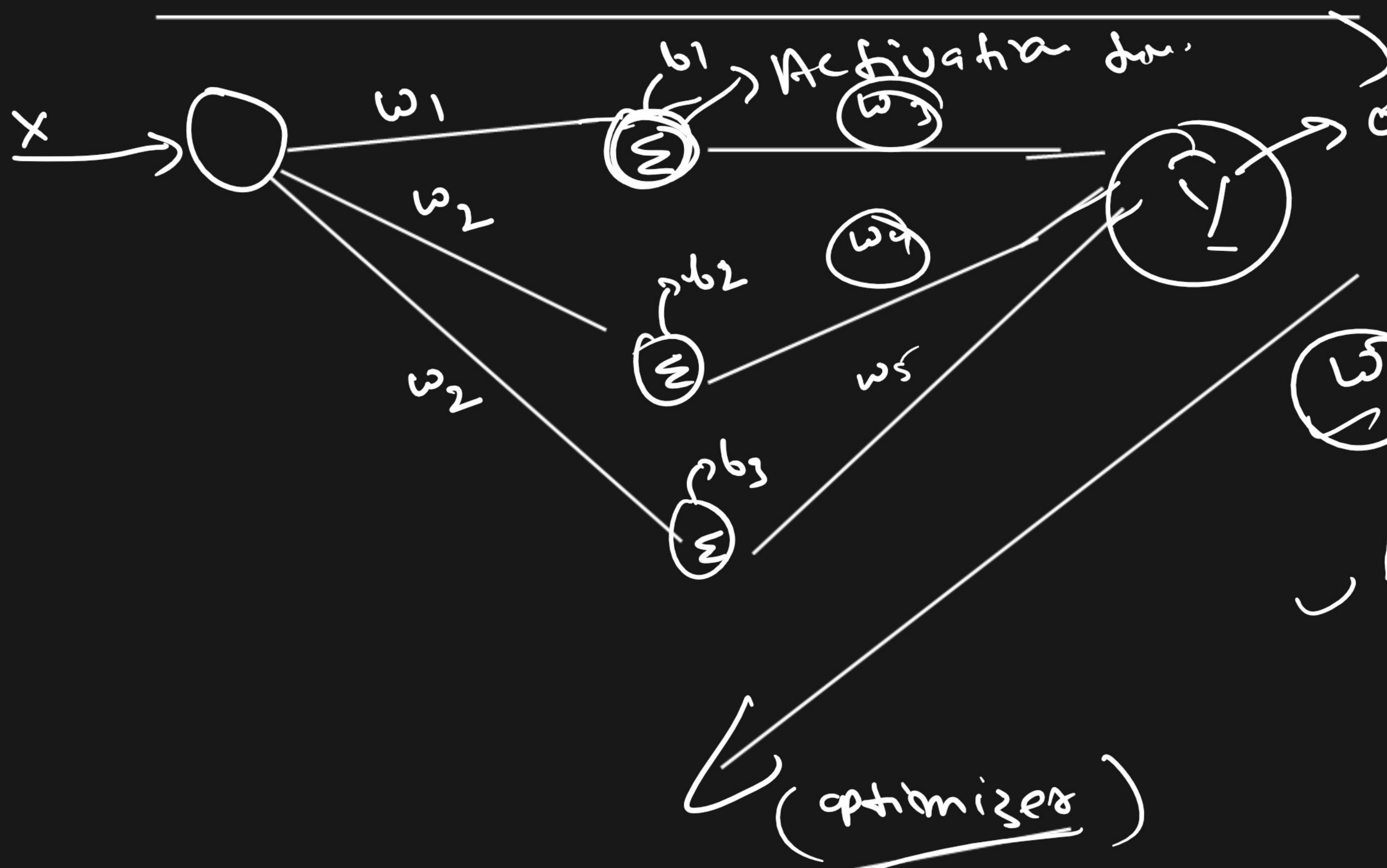
$$\frac{\partial y}{\partial x} = (n x^{n-1})$$

$$\left(\frac{dy}{dx}\right)$$

$$L = \frac{1}{n} \sum \left(y - \left(\underline{\hat{y}} \right) \right)^2$$

$$\frac{\partial L}{\partial w_3} = \frac{1}{n} \sum \left(y - \left((x_1 w_1 + b_1) \underline{w_3} + \underbrace{(x_1 w_2 + b_2) \cdot w_4}_{\substack{y \\ 0}} \right) \right)$$

$$\frac{\partial L}{\partial w_3} = \frac{1}{n} \sum \left(\underline{y} - (x_1 w_1 + b_1) \right)$$



output function

$$L = (y - \hat{y})$$ loss fun

$$w_n = w_o - \eta \frac{\partial L}{\partial w_n}$$

$$b_n = b_o - \eta \frac{\partial L}{\partial b}$$

$$y = m x + c$$

$$m_n = m_o - \eta \left(\frac{\partial L}{\partial m}\right)$$

$$L = \frac{1}{2}(y - \hat{y})^2$$

$(x-y)^2$

$$\frac{\partial L}{\partial \hat{y}} = \frac{1}{2}(y^2 - 2y\hat{y} + \hat{y}^2)$$

$$L = \frac{1}{N}\sum_{i=1}^{N}(y - \hat{y})^2 \quad \text{— (1)}$$

$$L = \frac{1}{N}\sum(y - (mx + c))^2 \quad \text{— (1)}$$

$$\left(\frac{\partial L}{\partial m}\right)$$

$$y = x^n$$

$\frac{\partial \hat{y}}{\partial x} = n x^{n-1}$

$$\left(\frac{\partial L}{\partial \hat{y}}\right) = \frac{1}{2}\left(y^2 - 2y\hat{y} + \hat{y}^2\right)$$

$$= \overset{=0}{\left(\frac{y^2}{2}\right)} - y\hat{y} + \frac{\hat{y}^2}{2}$$

$$= 0 - y + \frac{\cancel{2}}{\cancel{2}}\hat{y}$$

$$= (-y + \hat{y})$$

$$\frac{\partial L}{\partial \hat{y}}$$

$$\left(\frac{\partial L}{\partial w}\right) = \left(\frac{\partial L}{\partial \hat{y}}\right) \cdot \frac{\partial \hat{y}}{\partial w}$$

$$= -(y - \hat{y}) \cdot \left(\frac{\partial \hat{y}}{\partial w}\right)$$

$$= -(y-\hat{y}) \cdot \frac{\partial}{\partial w}(wx + b^{0})$$

$$= -(y-\hat{y}) \cdot x$$

$$\frac{\partial L}{\partial w} = \underline{-((y-\hat{y}) \cdot x)}$$

$$w_n = w_o - \eta \left(\frac{\partial L}{\partial w}\right)$$

$$= w_o - \eta - (y-\hat{y}) x$$

$$(w_n) = \underline{w_o + \eta (y-\hat{y}) x}$$

$$=$$

$$y = w x + b$$

$$\hat{y} =$$

$$L = \frac{y - \hat{y}}{}$$

$$MSE = \left(\frac{1}{N} \sum_{i=1}^{N} (y - \hat{y})^2 \right)$$

$$w_n = w_o - \eta \left(\frac{dL}{dw} \right)$$

$$\frac{\partial L}{\partial w} = \left(\frac{\partial L}{\partial \hat{y}}\right)\left(\frac{\partial \hat{y}}{\partial w}\right)$$

$$= \frac{\partial}{\partial \hat{y}}\left(\frac{1}{2}(y-\hat{y})^2\right) \cdot \frac{\partial}{\partial w}(wx+b)$$

$$= \frac{\partial}{\partial \hat{y}}\left(\frac{1}{2}(y^2 - 2y\hat{y} + \hat{y}^2)\right) \cdot \left(\frac{\partial}{\partial w}\right)(x)$$

$$= \frac{\partial}{\partial \hat{y}} \frac{1}{2}(0 - 2y + 2\hat{y}) \cdot x$$

$$= (-y + \hat{y})\ x$$

$$= (-(y - \hat{y}) \cdot x)$$

$$w_n = w_0 - \eta\left(\frac{\partial L}{\partial w}\right) = (w_0 + \eta(y - \hat{y}) \cdot x)$$