

Learning- Back Propagation

Chain rule..

x



$$y = 3x$$



$$z = y - 5$$

$$\frac{dw}{dx} = 3 \times 1 \times \tanh'(z)$$



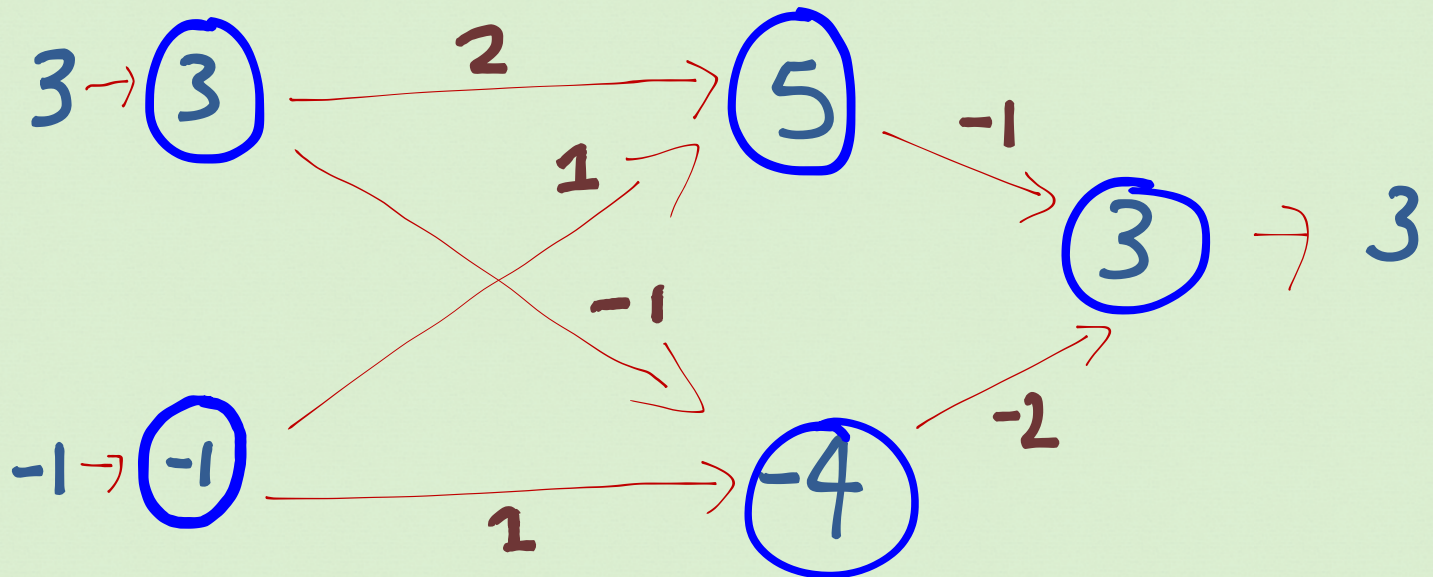
$$w = \tanh(z)$$



w

.....feed forward....

Forward pass



Computation

$$3 = (-1 \ -2) \begin{pmatrix} 2 \\ -1 \end{pmatrix} + \begin{pmatrix} 3 \\ -1 \end{pmatrix}$$

$$\text{actual} = 2 \quad \text{Loss} = 1$$

Mathematical calc.

$$\begin{aligned}L &= y - (w_1 \ w_2) \begin{pmatrix} w_3 & w_4 \\ w_5 & w_6 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \\ &= 2 - 3(w_1 w_3 + w_2 w_5) \\ &\quad + (w_1 w_4 + w_2 w_6)\end{aligned}$$

$$\frac{\partial L}{\partial w_1} = -3w_3 + w_4 = -5$$

$$\frac{\partial L}{\partial w_2} = -3w_5 + w_6 = 4$$

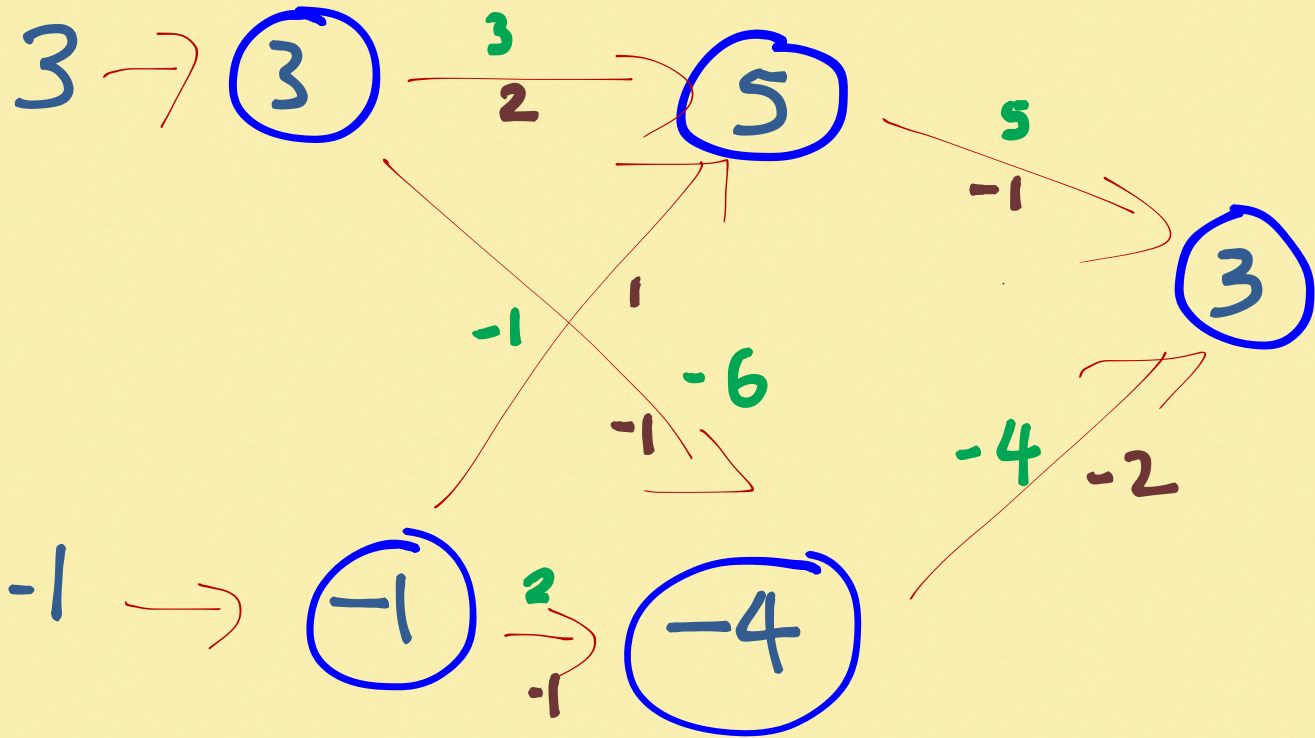
$$\frac{\partial L}{\partial w_3} = -3w_1 = 3$$

$$\frac{\partial L}{\partial w_4} = w_1 = 1$$

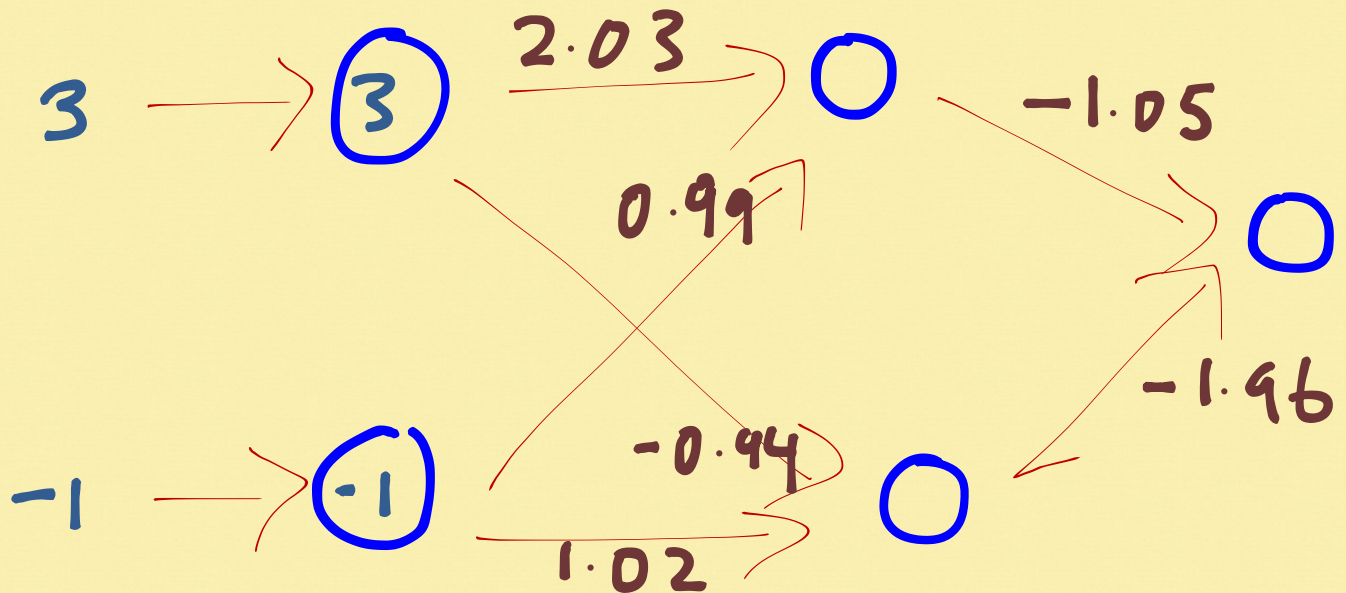
$$\frac{\partial L}{\partial w_5} = -3w_2 = 6$$

$$\frac{\partial L}{\partial w_6} = w_2 = 2$$

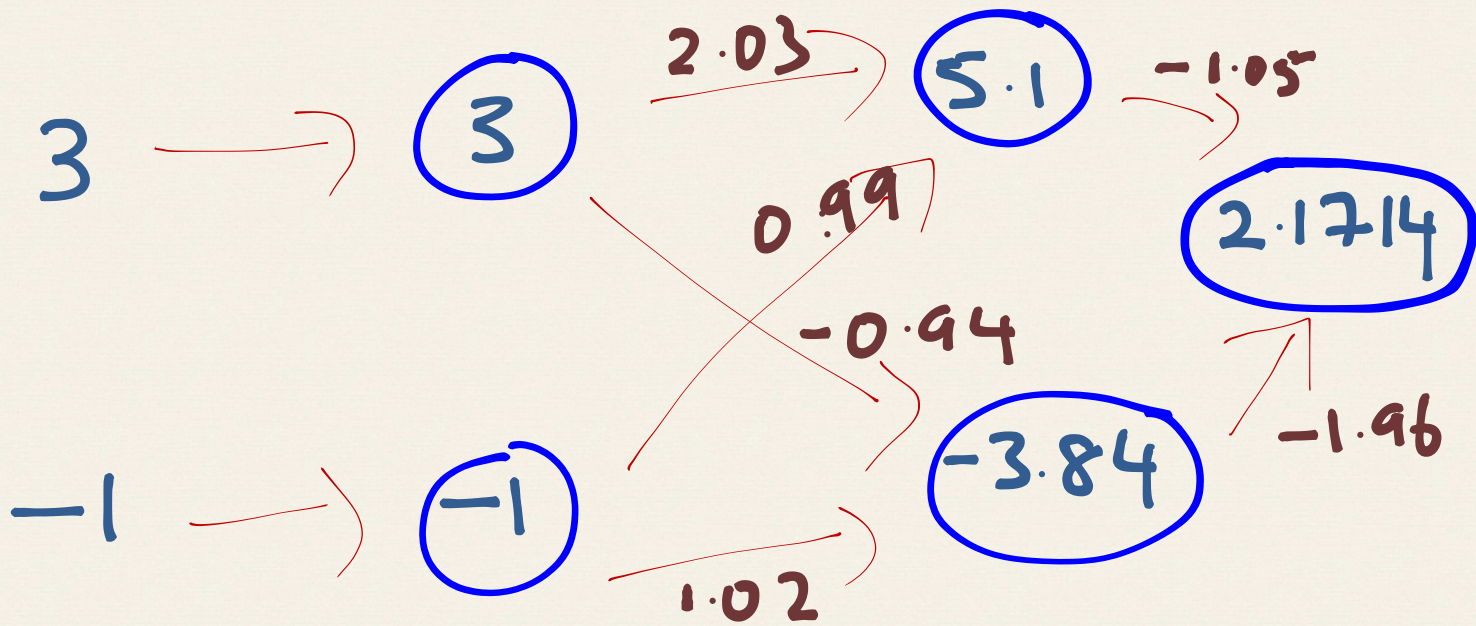
Backward pass $-\nabla L$



Update $\epsilon = 1/100$



output update..



$$\text{Loss} = 0.1714.$$

New weights..

LEARNING !