Day-6 28 June 2023

$$\boxed{s(x) = \frac{1}{1+e^{-x}}}$$

$$f \in \Sigma_2^{1,1}(s)$$

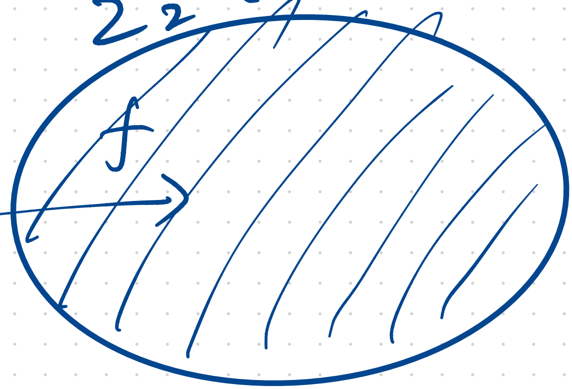
$$f(x) = \sum_{j=1}^{2} w_j \, s(A_j(x))$$

$$f(x) = w_3 h_1 + w_4 h_2$$

$$\boxed{f(x) = \underline{w_3}\Big(s(\underline{w_1}x + \underline{b_1})\Big) + \underline{w_4}\Big(s(\underline{w_2}x + \underline{b_2})\Big)}$$

$$\Sigma_2^{1,1}(s)$$

$$f \approx x^2$$

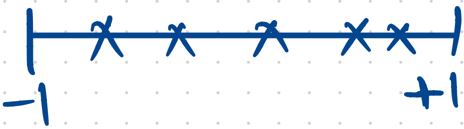


$w_i \in \mathbb{R}$, $b_j \in \mathbb{R}$

$\boxed{6}$

$$f(x) = g(\underbrace{w_1, w_2, w_3, w_4, b_1, b_2})$$
$$= x^2$$

"Traing Examples"



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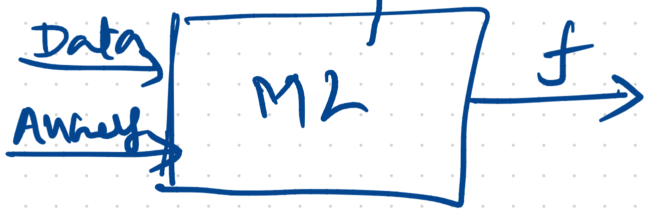
$-1 \rightarrow 1$

$0 \rightarrow 0$

$\frac{1}{2} \rightarrow \frac{1}{4}$

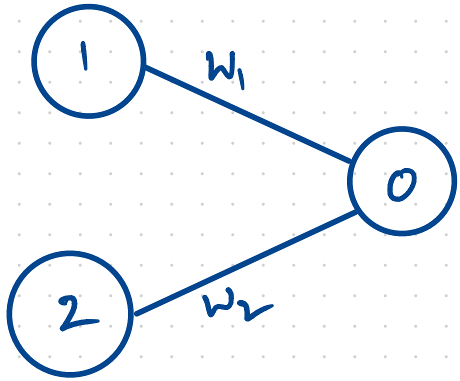
$-\frac{1}{3} \rightarrow \frac{1}{9}$



Inputs Forward

$x \rightarrow$

. . . . . .



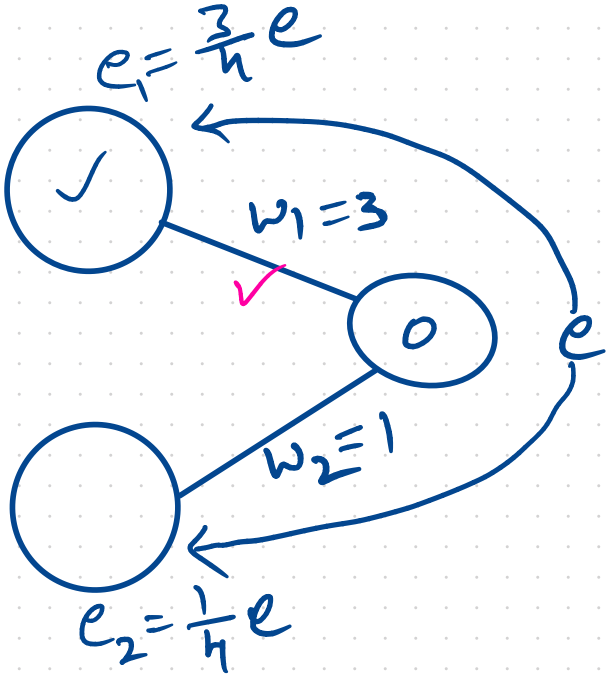
$\boxed{e = t - o}$

Sending error Backwards

"Back Propagation"

1. $\boxed{\text{Sharing the error}}$ ✓
2. Update weights ✓

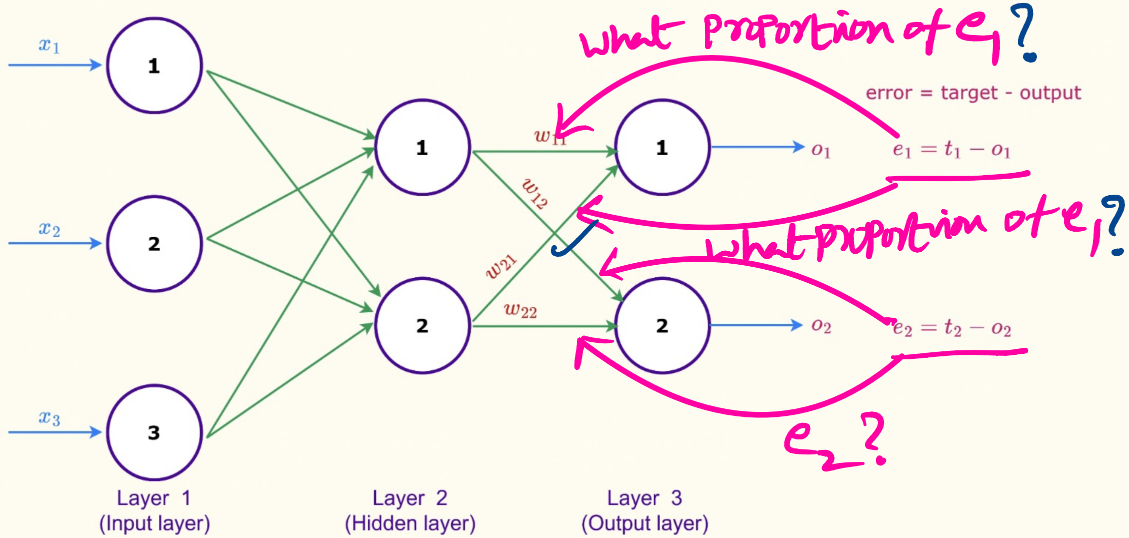
"Calculus"



$w_1 + w_2 = 4$

Back Propagation

$$Error = (desired\ target - output\ from\ neural\ network)$$

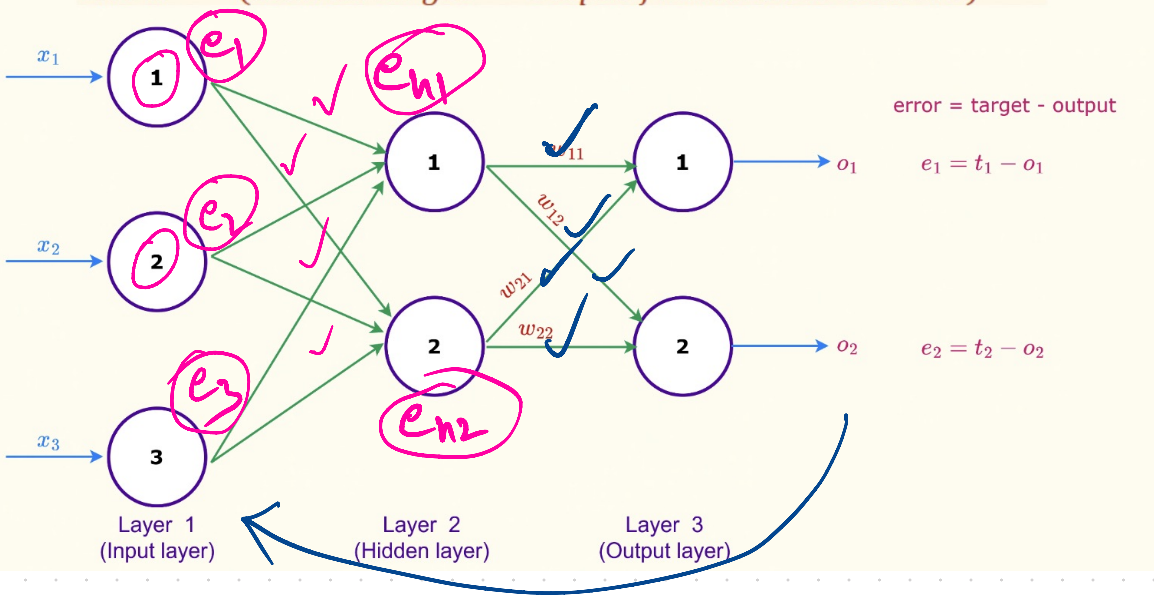


$$\left(\frac{w_{11}}{w_{11}+w_{21}}\right)e_1, \quad \left(\frac{w_{21}}{w_{11}+w_{21}}\right)e_1$$

$$\left(\frac{w_{12}}{w_{12}+w_{22}}\right)e_2, \quad \left(\frac{w_{22}}{w_{12}+w_{22}}\right)e_2$$

Back Propagation

$$Error = (desired\ target - output\ from\ neural\ network)$$



$$e_{h1} = \left(\frac{w_{11}}{w_{11}+w_{21}}\right)e_1 + \left(\frac{w_{12}}{w_{12}+w_{22}}\right)e_2$$

$$e_{h2} = \left(\frac{w_{21}}{w_{11}+w_{21}}\right)e_1 + \left(\frac{w_{22}}{w_{12}+w_{22}}\right)e_2$$

$$
\begin{pmatrix} e_{h_1} \\ e_{h_2} \end{pmatrix} = \begin{pmatrix} \dfrac{w_{11}}{w_{11}+w_{21}} & \dfrac{w_{12}}{w_{12}+w_{22}} \\ \dfrac{w_{21}}{w_{11}+w_{21}} & \dfrac{w_{22}}{w_{12}+w_{22}} \end{pmatrix} \begin{pmatrix} e_1 \\ e_2 \end{pmatrix}
$$

$$
\begin{pmatrix} e_{h_1} \\ e_{h_2} \end{pmatrix} = \underline{\begin{pmatrix} w_{11} & w_{12} \\ w_{21} & w_{22} \end{pmatrix}} \begin{pmatrix} e_1 \\ e_2 \end{pmatrix}
$$

$$
\| \quad T
$$

$$
\underline{\begin{bmatrix} w_{11} & w_{21} \\ w_{12} & w_{22} \end{bmatrix}}
$$

$$
\boxed{e_H = W^T e}
$$

$$\begin{bmatrix} e_1 \\ e_2 \\ e_3 \end{bmatrix} = \begin{bmatrix} w_{11} & w_{21} & w_{31} \\ w_{12} & w_{22} & w_{32} \end{bmatrix}^T \begin{bmatrix} e_{h_1} \\ e_{h_2} \end{bmatrix}$$

$$3 \times 2 \qquad 2 \times 1$$