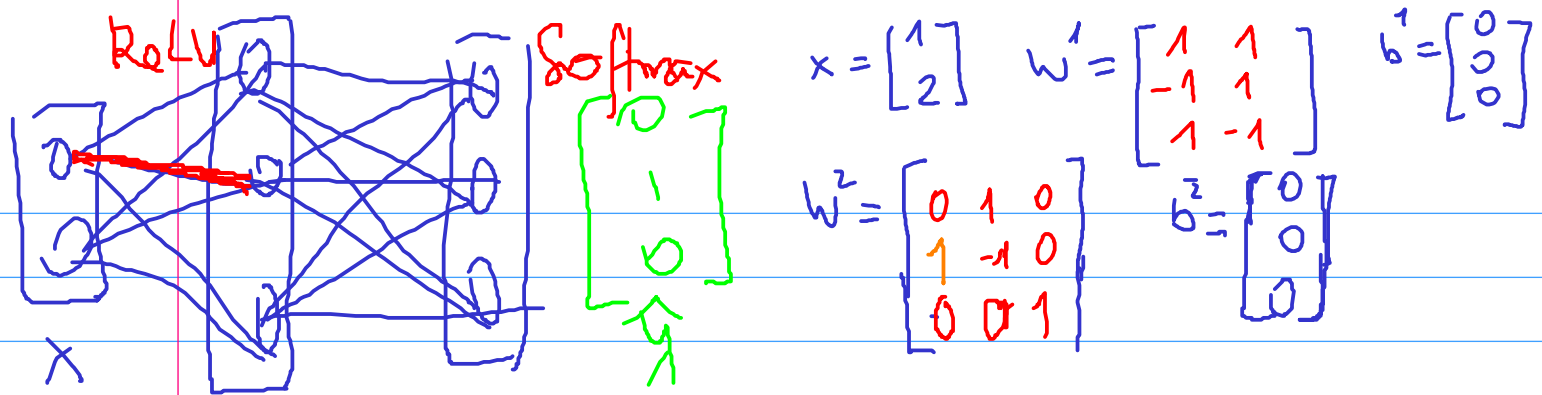




$$\frac{\delta C}{\delta w_{21}^1} = ?$$

C : cross entropy

$$\frac{\delta C}{\delta w_{21}^1} = \frac{\delta z_2^1}{\delta w_{21}^1} \cdot \frac{\delta C}{\delta z_2^1} = ?$$

$$x_1 = 1 \checkmark$$

Let's start with the last layer:

$$\delta^2 = \text{softmax}'(z^2) \cdot \nabla C(y)$$

$$= \begin{bmatrix} y_1 \\ y_2 - 1 \\ y_3 \end{bmatrix} = \begin{bmatrix} 0.24 \\ -0.34 \\ 0.1 \end{bmatrix}$$

$$\delta^1 = \text{ReLU}'(z^1) (W^2)^T \cdot \delta^2$$

$$= \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \left(\begin{bmatrix} 0 & 1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0.24 \\ -0.34 \\ 0.1 \end{bmatrix} \right) = \begin{bmatrix} -0.34 \\ 0.58 \\ 0 \end{bmatrix}$$