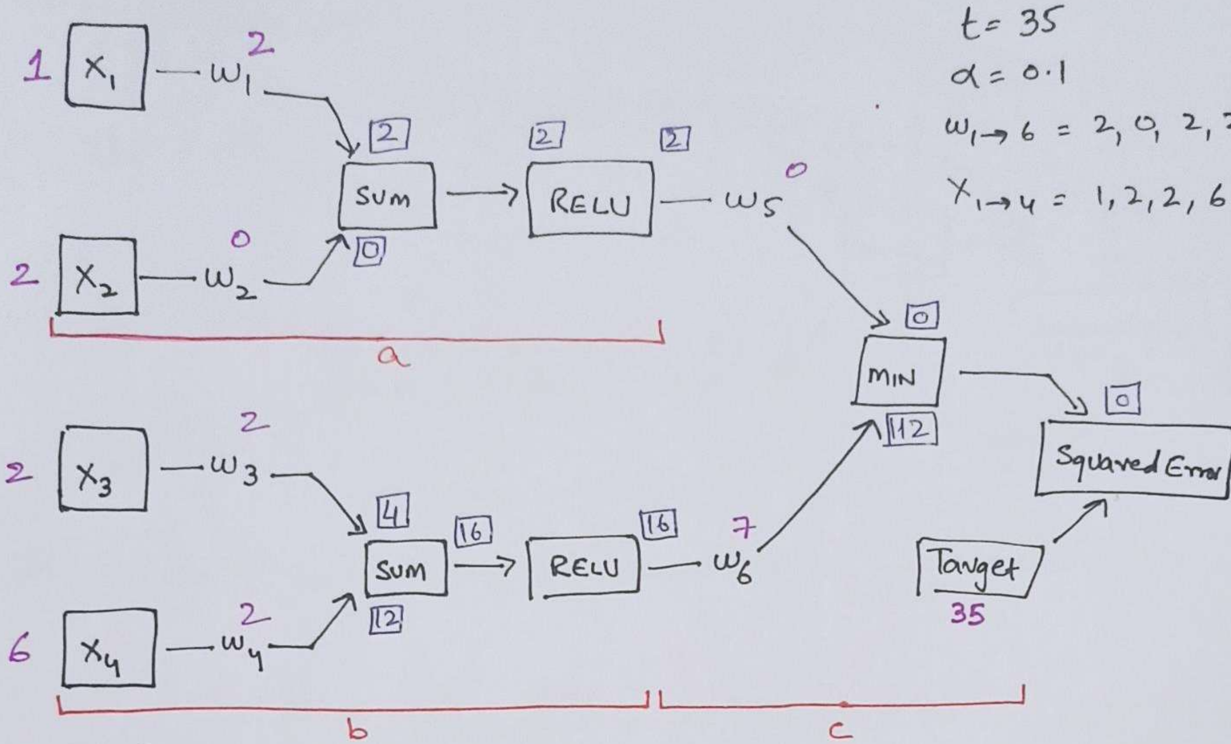
$t = 35$

$\alpha = 0.1$

$w_{1 \to 6} = 2, 0, 2, 2, 0, 7$

$x_{1 \to 4} = 1, 2, 2, 6$



FORWARD Pass

The forward pass values are shown in blue boxed values at each node in above diagram. In first leg

$$a = g(x_1 \cdot w_1 + x_2 \cdot w_2)$$

$$a = g(1 \times 2 + 2 \times 0) = g(2) = 2$$

In Second leg

$$b = g(x_3 w_3 + x_4 w_4) = g(2 \times 2 + 6 \times 2) = g(16) = 16$$

Now

$$c = \min(a \times w_5, b \times w_6) = \min(2 \times 0, 16 \times 7) = \min(0, 112) = 0$$

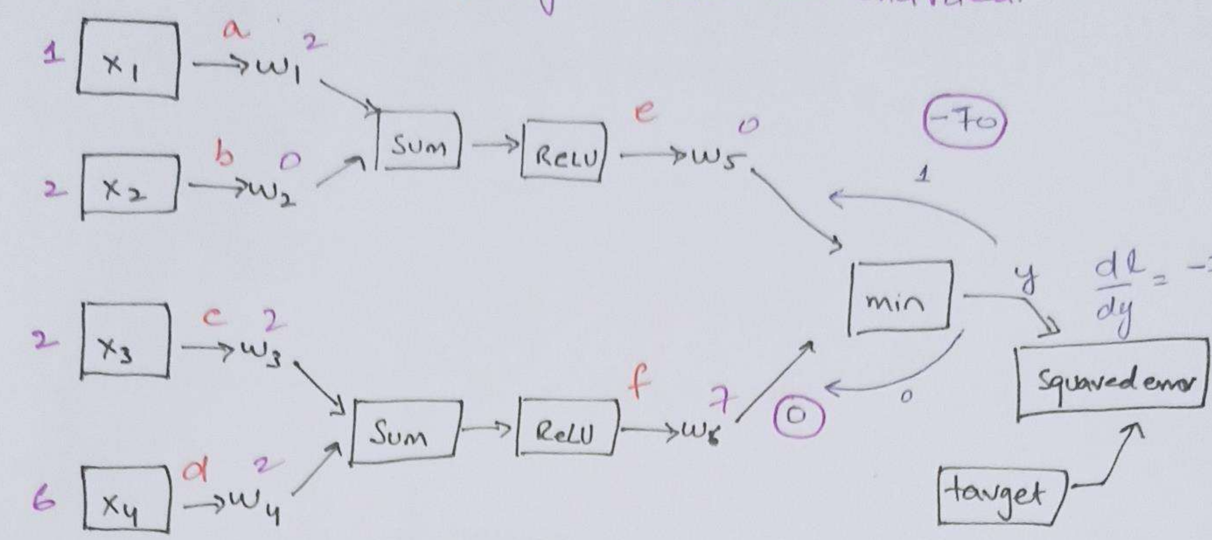
CALCULATING LOSS

$$\text{loss} = (0 - 35)^2 = 1225$$

$$\frac{dl}{dy} = \frac{d}{dy}(y-t)^2 = 2(y-t)(1) = 2(0-35) = -70$$

BACKWARD PASS

Backpropagated values are encircled.



From Forward pass, we know the top leg is our active leg

finding $\frac{\partial l}{\partial e} = \frac{\partial y}{\partial e} \cdot \frac{\partial l}{\partial y} = 1 \cdot (-70) = -70$

$$\frac{\partial l}{\partial f} = \frac{\partial y}{\partial f} \cdot \frac{\partial l}{\partial y} = 0 \cdot (-70) = 0$$

Hence on Second leg, the weights will not change.

i.e.

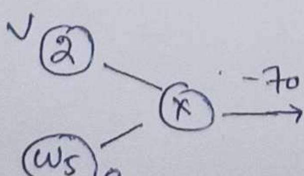
$$\boxed{w_6 = w_6 - \alpha \frac{\partial l}{\partial f} = w_6 - 0 = 7}$$

Similarly

$$\boxed{\begin{aligned} w_3 &= 2 \\ w_4 &= 2 \end{aligned}}$$

Now. On first leg.

$$w_5 = w_5 - \alpha \frac{\partial l}{\partial w_5} =$$



$$\Rightarrow \frac{\partial l}{\partial w_5} = \frac{\partial e}{\partial w_5} \cdot \frac{\partial l}{\partial e} = (2)(-70) = -140$$

which implies that

$$w_5 = w_5 - (0.1)(-140) = +14$$

$$\boxed{w_5 = 14}$$

Now for other derivative to backpropagate

$$\frac{\partial l}{\partial v} = \frac{\partial e}{\partial v} \cdot \frac{\partial l}{\partial e} = 0 \cdot (-70) = 0$$

Since $\frac{\partial l}{\partial v} = 0$, the previous weights will now remain unchanged ~~as~~ in the Complete backpropagation.

Hence

$$\boxed{\begin{array}{l} w_1 = 2 \\ w_2 = 0 \end{array}}$$

$$\because \; w_1 = w_1 - \alpha \frac{\partial l}{\partial w_1} \Rightarrow w_1 - 0 = w_1$$

$$w_2 = w_2 - \alpha \frac{\partial l}{\partial w_2} \Rightarrow w_2 - 0 = w_2$$

So the ~~errors~~ weights at the end of backprop ~~is~~ are:-

$$\boxed{\begin{array}{l} w_1 = 2 \\ w_2 = 0 \\ w_3 = 2 \\ w_4 = 2 \\ w_5 = 14 \\ w_6 = 7 \end{array}}$$