

$$\frac{\partial L}{\partial W^{(1)}} = \frac{\partial L}{\partial o} \cdot \frac{\partial \sigma}{\partial h} \cdot \frac{\partial h}{\partial z} \cdot \frac{\partial z}{\partial W^{(1)}}$$

$$\frac{\partial L}{\partial o} = \frac{1}{2} \cdot 2 \cdot (y - o) \cdot (-1) = (-y + o)$$

$$\frac{\partial \sigma}{\partial h} = W^{(2)}$$

$$\frac{\partial h}{\partial z} = \pi(z) \cdot (1 - \pi(z))$$

$$\frac{\partial z}{\partial W^{(1)}} = x^T$$

$$\frac{\partial L}{\partial W^{(1)}} = \left((-y + o)^T \cdot W^{(2)} \right)^T \odot (\pi(z) \cdot (1 - \pi(z)) \cdot x^T$$