

# Neural Networks

## Gradients

$$y = W \cdot x \tag{1}$$

$$\frac{\partial z}{\partial W} = \frac{\partial z}{\partial y} \frac{\partial y}{\partial W} \tag{2}$$

$$= \frac{\partial z}{\partial y} \cdot X^T \tag{3}$$

$$\frac{\partial z}{\partial x} = \frac{\partial z}{\partial y} \frac{\partial y}{\partial x} \tag{4}$$

$$= W^T \cdot \frac{\partial z}{\partial y} \tag{5}$$