

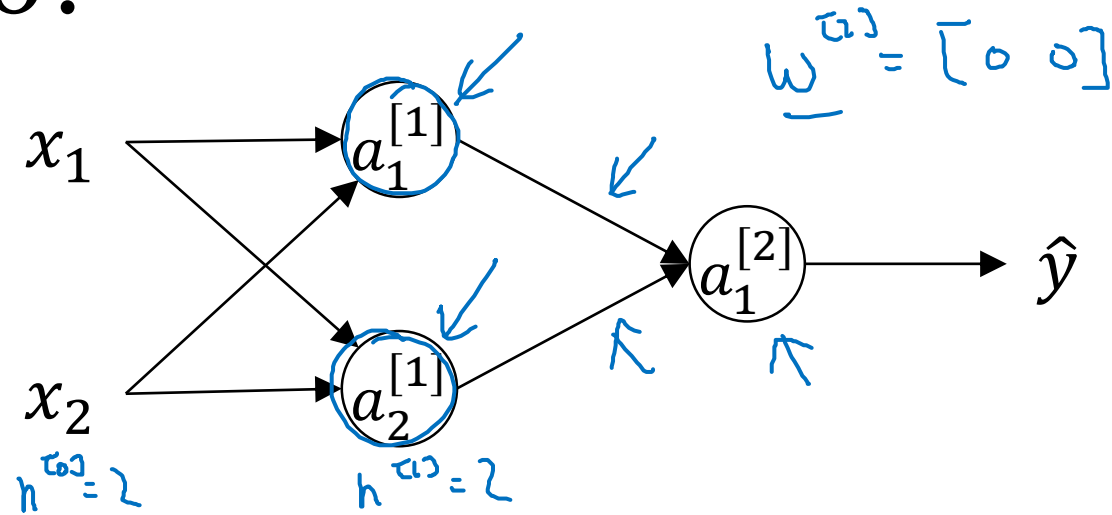


deeplearning.ai

One hidden layer
Neural Network

Random Initialization

What happens if you initialize weights to zero?



$$w^{(1)} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

$$a_1^{(1)} = a_2^{(1)}$$

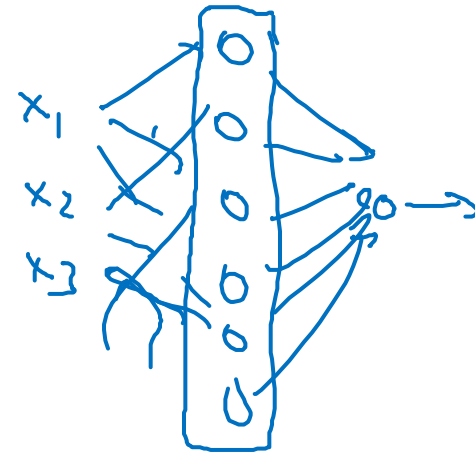
$$\Delta w = \begin{bmatrix} u & v \\ u & v \end{bmatrix}$$

$$b^{(1)} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\Delta z_1 = \Delta z_2$$

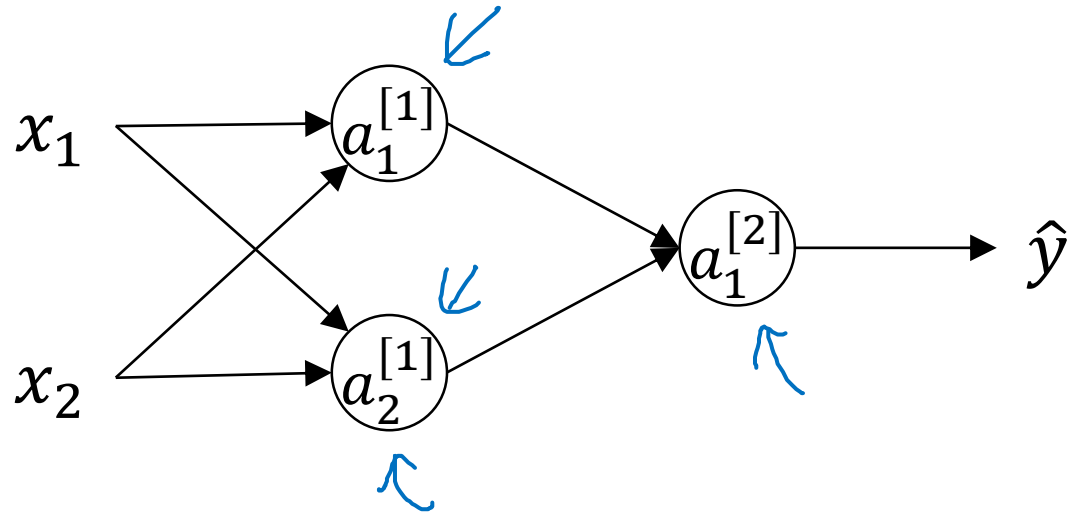
$$w^{(1)} = w^{(1)} - \alpha \Delta w$$

Symmetric



$$w^{(1)} = \begin{bmatrix} \dots & \cdot \\ \dots & \cdot \end{bmatrix}$$

Random initialization



→ $w^{[1]} = \text{np.random.randn}(2,2) * \frac{0.01}{100?}$
 $b^{[1]} = \text{np.zeros}(2,1)$
 $w^{[2]} = \text{np.random.randn}(1,2) * 0.01$
 $b^{[2]} = 0$

$$z^{[1]} = w^{[1]}x + b^{[1]}$$
$$a^{[1]} = g^{[1]}(z^{[1]})$$

