



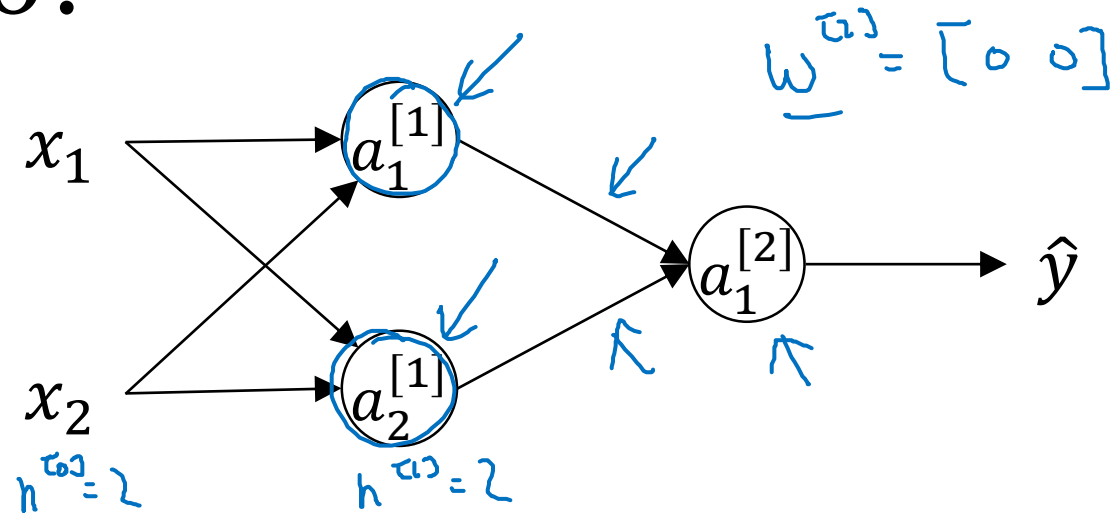
deeplearning.ai

One hidden layer  
Neural Network

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Random Initialization

# What happens if you initialize weights to zero?



$$w^{[1]} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

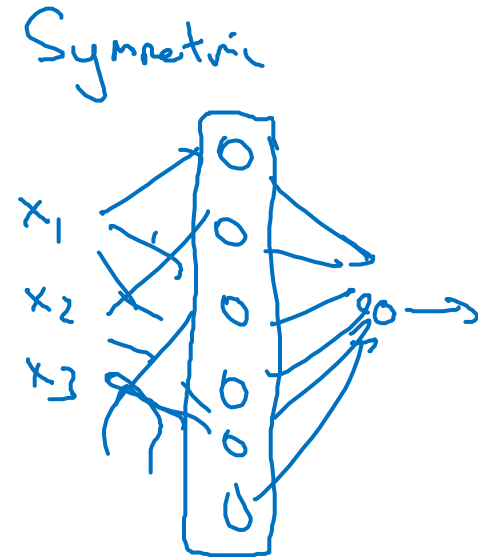
$$a_1^{[1]} = a_2^{[1]}$$

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

$$b^{[1]} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

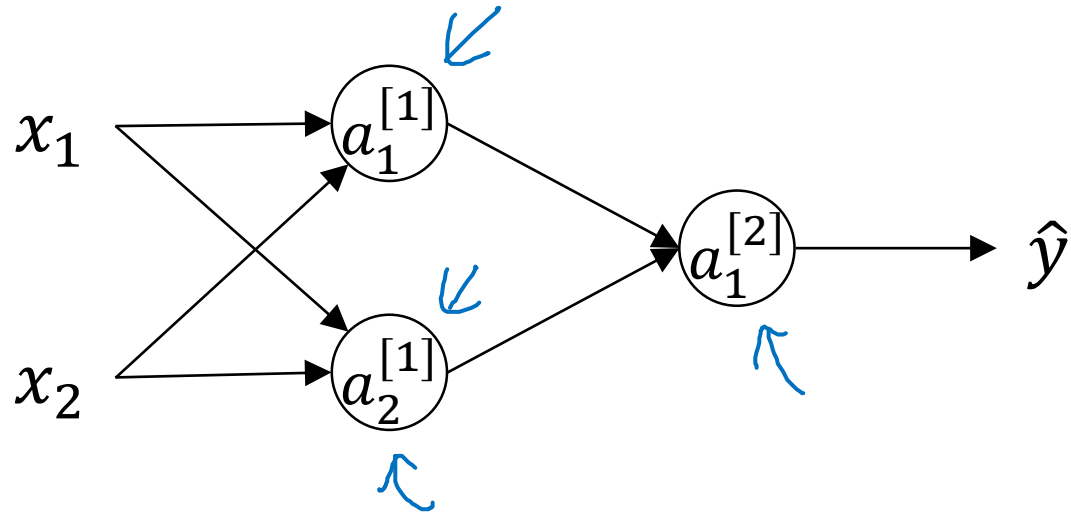
$$\Delta z_1 = \Delta z_2$$

$$w^{[1]} = w^{[1]} - \alpha \Delta w$$

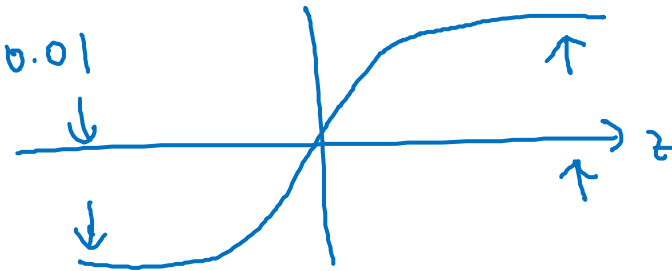


$$w^{[1]} = \begin{bmatrix} \dots & \cdot \\ \dots & \cdot \end{bmatrix}$$

# Random initialization



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



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