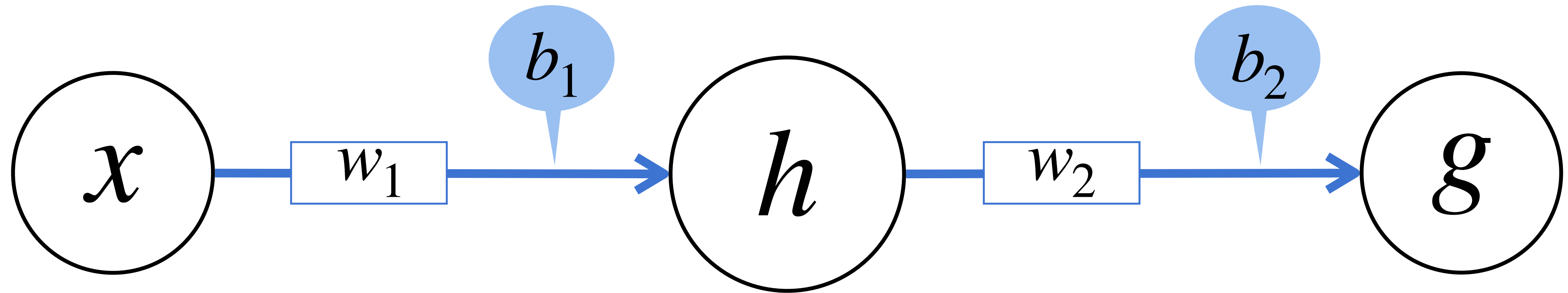


# Backpropagation



$$h = w_1 \cdot x + b_1$$

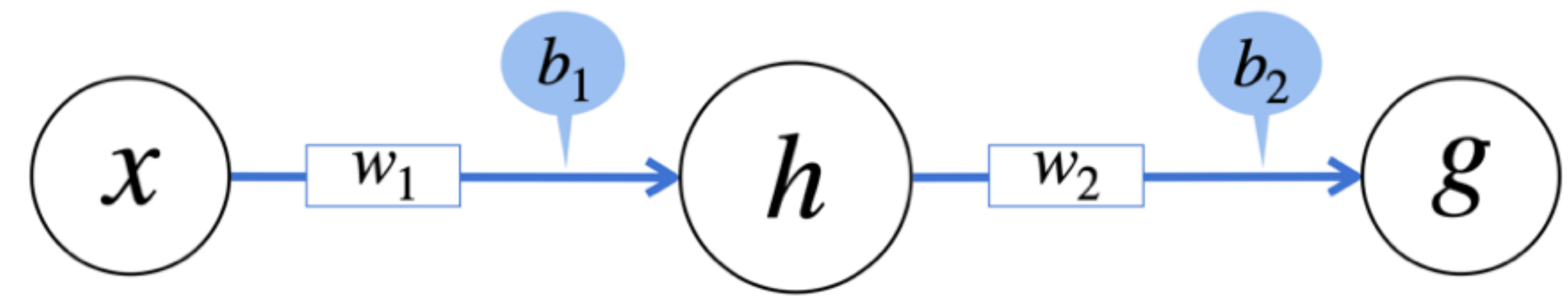
$$g = w_2 \cdot x + b_2$$

how close is  $g$  to our  
actual value?

Loss function (MSE):

$$\frac{1}{N} \sum_i^N (y_i - g_i)^2 \implies \frac{1}{N} \sum_i^N (y_i - \underbrace{(w_2 \cdot (w_1 \cdot x_i + b_1))}_{= h} + b_2)^2$$

# Backpropagation



$$\frac{1}{N} \sum_i^N (y_i - g_i)^2 \implies \frac{1}{N} \sum_i^N \underbrace{(y_i}_{\text{actual}} - \underbrace{(w_2 \cdot (w_1 \cdot x_i + b_1) + b_2)}_{\text{predicted}})^2$$

this is what the  
gradient tells us!

How change  $w_1$  to reduce our loss?  
How change  $w_2$  to reduce our loss?  
How change  $b_1$  to reduce our loss?  
How change  $b_2$  to reduce our loss?