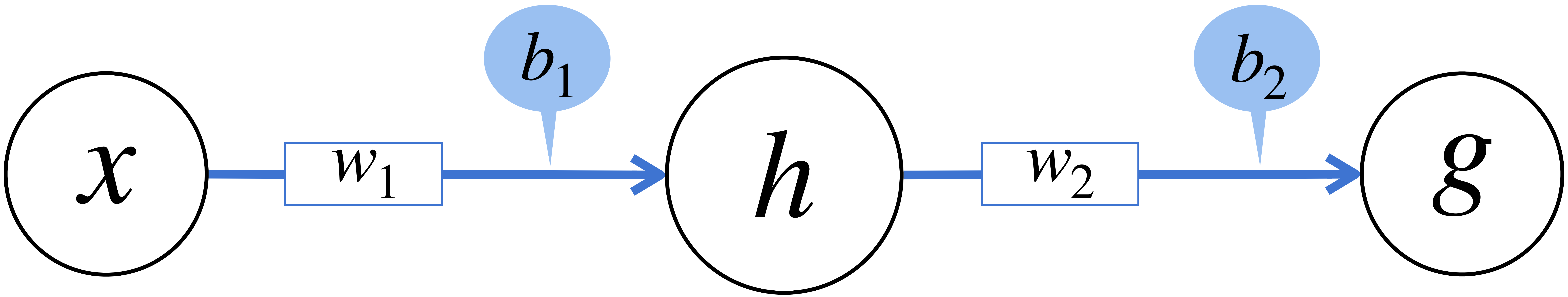
Backpropagation



Chain rule:

If we want to know how changing x affects $f(g(x))$ we first need to think about how changing x affects $g(x)$ and then how changing $g(x)$ affects$f(g(x))$:

$$\frac{\partial f(g(x))}{\partial x} = \frac{\partial f}{\partial g} \cdot \frac{\partial g}{\partial x}$$

the derivative of the outer function f evaluated at $g(x)$
multiplied by the derivative of the inner function $g(x)$

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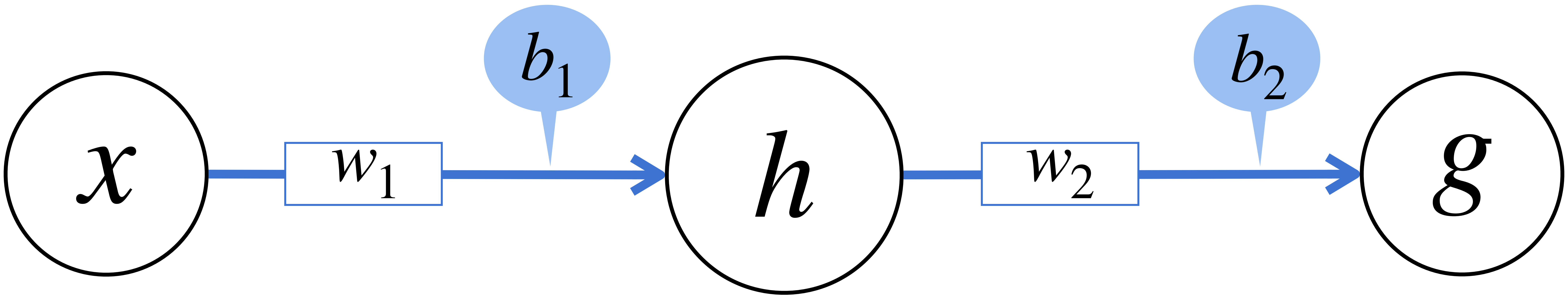

$$h = w_1 \cdot x + b_1$$

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

how close is g to our actual value?

Loss function (MSE):

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