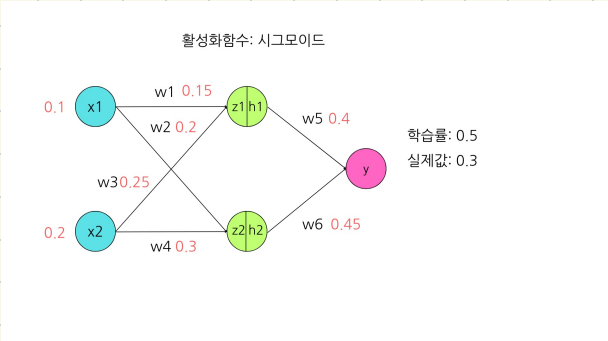
순전파



$z_1 = x_1 \cdot w_1 + x_2 w_3 = 0.1 \times 0.15 + 0.2 \times 0.25 = 0.015 + 0.05 = 0.065$

$h_1 = \frac{1}{1+e^{z_1}} = 0.4837557893$

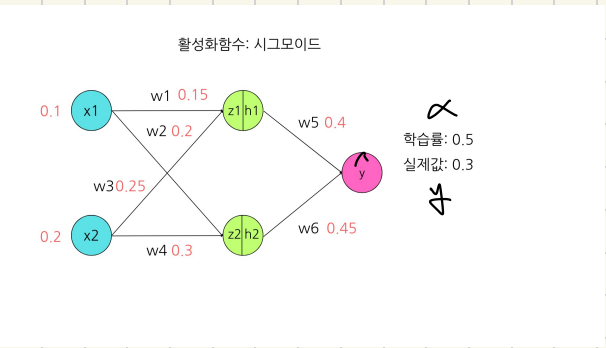
$z_2 = x_1 \cdot w_2 + x_2 \cdot w_4 = 0.1 \times 0.2 + 0.2 \times 0.3 = 0.08$

$h_2 = \frac{1}{1+e^{z_2}} = 0.4800165984$

$\hat{y} = h_1 \times w_5 + h_2 \times w_6 = 0.4095070845$

$E_y = \frac{1}{2}(y - \hat{y})^2 = \frac{1}{2}(0.3 - 0.4095070845)^2 = 0.0059959007$

역전파 (W_5)



$$\frac{\partial E_{\hat{y}}}{\partial W_5} = \frac{\partial E_{\hat{y}}}{\partial \hat{y}} \times \frac{\partial \hat{y}}{\partial W_5}$$

$$\frac{\partial E_{\hat{y}}}{\partial \hat{y}} = \frac{1}{2}(y - \hat{y}) \times 2 \times (-1) = (0.3 - 0.4095070845)(-1)$$

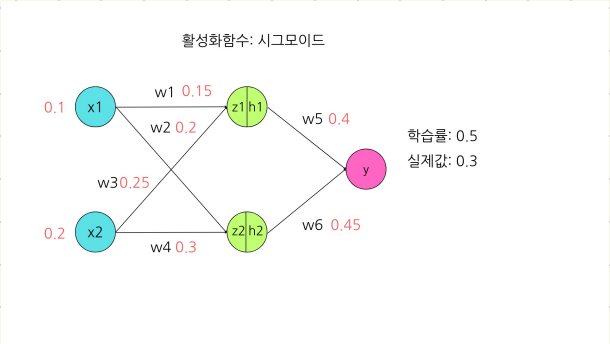
$$= 0.1095070845$$

$$\frac{\partial \hat{y}}{\partial W_5} = h_1 = 0.4837557893$$

$$W_5^{+} = W_5 - \alpha \frac{\partial \hat{y}}{\partial W_5} = 0.4 - 0.5 \times 0.4837557893$$

$$= 0.1581221053$$

역전파 (W_1)



$$\frac{\partial E_{total}}{\partial w_1} = \frac{\partial E_{total}}{\partial h_1} \times \frac{h_1}{\partial z_1} \times \frac{\partial z_1}{\partial w_1}$$

$$\frac{\partial E_{total}}{\partial h_1} = (h_1 \times w_5 + h_2 \times w_6)' = w_5 = 0.4$$

$$\frac{\partial h_1}{\partial z_1} = h_1 \times (1 - h_1) = 0.4837557893 \times (1 - 0.4837557893)$$

$$= 0.2497361233$$

$$\frac{\partial z_1}{\partial w_1} = (x_1 \times w_1 + x_2 \cdot w_3)' = x_1 = 0.1$$

$$\frac{\partial E_{total}}{\partial w_1} = 0.4 \times 0.2497361233 \times 0.1 = 0.0099894449 3$$

$$w_1^{+} = 0.15 - (0.5 \times 0.0099894449 3) = 0.1450052775 3$$