Answer 1 $\rightarrow$

Given =

$$\sigma(z) = \frac{1}{1+e^{-z}}$$

$$h_1 = \frac{1}{1+e^{-w_1x_1-w_2x_2}}$$

$$L(y,\hat{y}) = \|\hat{y}-y\|^2$$

$$(x_1, x_2, x_3, x_4) = (0.7, 1.2, 1.1, 1.2)$$

$$y = 0.5$$

$$
\begin{aligned}
S_1 &= x_1w_1 + x_2w_2 \\
&= (0.7)(-1.7) + (1.2)(0.1) \\
&= (-1.19) + (0.12) \\
&= -1.07
\end{aligned}
$$

$$\boxed{\therefore S_1 = -1.07}$$

$$
\begin{aligned}
S_2 &= x_3w_3 + x_4w_4 \\
&= (1.1)(-0.6) + (2)(-1.8) \\
&= (-0.66) + (-3.6)
\end{aligned}
$$

$$\therefore \boxed{S_2 = -4.26}$$

Now $$h_1 = \frac{1}{1+e^{1.07}}$$

$$\boxed{h_1 = 0.255}$$

Let Calculate $S_3 = h_1w_5 + h_2w_6$

$$= (0.255)(-0.2) + (0.0139)(0.5)$$

$$\boxed{S_3 = -0.0441}$$

$$\hat{y} = \frac{1}{1+e^{-S_3}} = \frac{1}{1+e^{0.0441}} = \boxed{0.4889}$$

Back Propagation :

$$\frac{\partial E}{\partial w_1} = \frac{\partial E}{\partial \hat{y}} \cdot \frac{\partial \hat{y}}{\partial S_3} \cdot \frac{\partial S_3}{\partial h_1} \cdot \frac{\partial h_1}{\partial S_1} \cdot \frac{\partial S_1}{\partial w_1} \quad ; \quad \frac{\partial S_3}{\partial h_1} = w_5 \;\Big|\; \frac{\partial S_1}{\partial w_1} = x_1$$

$$\frac{\partial E}{\partial w_1} = 2\,\|\hat{y} - y\| \cdot \sigma'(S_3) \cdot w_5 \cdot \sigma'(S_1) \cdot x_1$$

$$= 2\,\|0.4889 - 0.5\| \times \sigma'(-0.441) \cdot (-0.2)$$
$$\times\ \sigma'(-1.07)\,(0.7$$

$$\sigma(S_3) = \frac{1}{1+e^{-(-0.04405)}} = \boxed{0.4884}$$

$$\sigma(S_1) = \frac{1}{1+e^{-(-1.07)}} = \boxed{0.2554}$$

$$\frac{\partial E}{\partial w_1} = [2\,\|0.4899 - 0.5\|] \times [(0.4884)(1-0.4884)](0.7)$$
$$\times\ [(0.2554)(1-0.2554)](0.1)$$

$$= [2\,(-0.107)] \times [(0.4889)\,(0.5116]$$

$$\boxed{\frac{\partial E}{\partial w_1} = -0.0014}$$