Date: No.:

1. $\frac{d}{dz}\frac{1}{1+e^{-z}} = -(1+e^{-z})^{-2}\times(-e)^{-z}$

$= \frac{e^{-z}}{(1+e^{-z})^2} = \frac{1+e^{-z}-1}{(1+e^{-z})^2} = \frac{1}{(1+e^{-z})} - \frac{1}{(1+e^{-z})^2} = \frac{1}{1+e^{-z}}\left(1-\frac{1}{1+e^{-z}}\right)$

$= \sigma(z)(1-\sigma(z))$

2. $W_{11}=0.5$, $W_{12}=-0.6$, $b=0.2$

x_1	x_2	y
0	1	0
0	0	1
1	1	1
1	0	1

① $0.5\times0+(-0.6)\times1+0.2=-0.4$

② $0.5\times0+(-0.6)\times0+0.2=0.2$

③ $0.5\times1+(-0.6)\times1+0.2=0.1$

④ $0.5\times1+(-0.6)\times0+0.2=0.7$

2-2 $\eta=0.05$로 설정

$b=0.2+0.05\times(-0)\cdot1=0.25$

$W_{11}=0.5+0.05\times(-0)\cdot1=0.55$

$W_{12}=(-0.6)+0.05\times(-0)\cdot1=-0.55$

재분류

① (0,1) $-0.55+0.2=-0.35$ $\varphi(-0.35)=0$

(0,0) 0.25 $\varphi(0.25)=1$

(1,1) $0.55-0.55+0.25$ $\varphi(0.25)=1$

(1,0) $0.55+0.25=0.75$ $\varphi(0.75)=1$

∴ 업데이트 XX

3. 입력층부터 전방향으로 ①~⑧

① $z_1^{(2)}=0.5\times0.1+0.5\times0.2$ $z_1^{(2)}=0.15$

$=0.05+0.1=0.15$

② $a_1^{(2)}=\frac{1}{1+e^{-0.15}}=0.54$

③ $z_1^{(3)}=0.54\times0.4+0.54\times0.15=0.3$

④ $a_1^{(3)}=0.57$

⑤ $z_2^{(2)}=0.3\times0.4+0.3\times0.2=0.18$

⑥ $a_2^{(2)}=0.54$

⑦ $z_2^{(3)}=0.54\times0.45+0.54\times0.35=0.43$

⑧ $a_2^{(3)}=0.61$

3-2. $J_1=\frac{1}{2}(0.57-0.5)^2=0.00245$

$J_2=\frac{1}{2}(0.61-0.8)^2=0.01805$

ate: No.:

3-3) $\eta = 0.1$

① $W_{2,1}^{(1)}$

$$\frac{\partial J_{total}}{\partial W_{2,1}^{(1)}} = \left(\frac{\partial J_1}{\partial a_1^{(2)}} + \frac{\partial J_2}{\partial a_1^{(2)}}\right) \cdot \frac{\partial a_1^{(2)}}{z_1^{(2)}} \cdot \frac{z_1^{(2)}}{W_{1,2}^{(1)}}$$

② $W_{2,2}^{(2)} = \frac{\partial J_2}{\partial a_2^{(3)}} \times \frac{\partial a_2^{(3)}}{\partial z_2^{(3)}} \times \frac{\partial z_2^{(3)}}{\partial W_{2,2}^{(2)}}$

① $\frac{\partial J_1}{\partial a_1^{(2)}} \times \underset{①}{\frac{\partial a_1^{(3)}}{\partial z_1^{(3)}}} \times \underset{②}{\frac{\partial z_1^{(3)}}{\partial a_1^{(2)}}} \times \underset{③}{\frac{\partial a_2^{(3)}}{\partial z_2^{(3)}}} \times \underset{④}{\frac{\partial z_2^{(3)}}{\partial W_{2,1}^{(1)}}}$

$+ \frac{\partial J_2}{\partial a_2^{(3)}} \times \underset{⑤}{\frac{\partial a_2^{(3)}}{\partial z_2^{(3)}}} \times \underset{⑥}{\frac{\partial z_2^{(3)}}{\partial a_2^{(2)}}} \times \underset{⑦}{\frac{\partial a_2^{(2)}}{\partial z_2^{(2)}}} \times \underset{⑧}{\frac{z_2^{(2)}}{\partial W_{2,1}^{(1)}}}$

① $\frac{\partial J_1}{\partial a_1^{(3)}} = \frac{2}{\partial a_1^{(3)}} (a_1^{(3)} - y_1)^2 = (a_1^{(3)} - y_1)$ $0.57 - 0.5 = 0.07$

② $\frac{\partial a_1^{(3)}}{\partial z_1^{(3)}} = \sigma(z_1^{(3)})(1 - \sigma(z_1^{(3)})) = a_1^{(3)}(1 - a_1^{(3)})$

$= 0.57(1 - 0.57)$

$= 0.57(0.43)$

$= 0.245$

③ $z_1^{(3)} = a_1^{(2)} \times W_{1,1}^{(2)} + a_2^{(2)} \times W_{1,2}^{(2)}$

④ $= 0.54 \times 0.4 + 0.54 \times 0.15 = 0.3$ $\therefore \frac{\partial z_1^{(3)}}{\partial a_2^{(2)}} = W_{1,2}^{(2)} = 0.015$

⑤ $\frac{\partial a_2^{(3)}}{\partial z_2^{(3)}} \times \frac{\partial z_2^{(3)}}{\partial W_{2,1}^{(1)}} = 0.124$

⑤ $a_2^{(3)} - y_2 = 0.61 - 0.2 = -0.19$

⑥ $0.61 \times 0.39 = 0.24$

⑦ 0.45

⑧ $0.54 \times 0.46 \times \frac{1}{2} = 0.124$

$\frac{\partial E_t}{\partial W_{2,1}^{(1)}} = 0.003 + (-0.003) = 0$

$\therefore W_{2,1}^{(1)} = 0.2 - 0.1(0) = \underline{0.2}$ //

② $= ⑤ \times ⑥ \times 0.54 = -0.025$

$W_{2,2}^{(2)} = 0.45 - 0.1(-0.025) = \underline{0.452}$ //