HW 1

1. $f'(x) = \frac{d}{dx}(1+e^{-x})^{-1} = -(1+e^{-x})^{-2}\frac{d}{dx}(1+e^{-x})$

$$= -(1+e^{-x})^{-2} \cdot e^{-x} \cdot \frac{d}{dx}(-x) = (1+e^{-x})^{-2} \cdot e^{-x}$$

$$= \frac{e^{-x}}{(1+e^{-x})^2} = \frac{1}{(1+e^{-x})} \cdot \frac{e^{-x}}{(1+e^{-x})}$$

$$= \frac{1}{1+e^{-x}} \cdot \frac{1+e^{-x}-1}{1+e^{-x}} = \frac{1}{1+e^{-x}}\left(1 - \frac{1}{1+e^{-x}}\right)$$

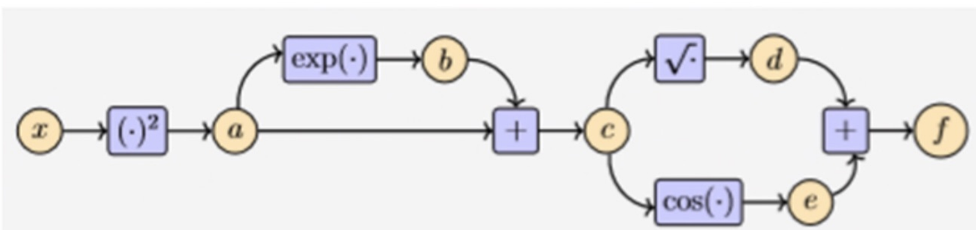
$$= f(x)(1-f(x))$$

2. $\frac{df}{dt} = \frac{df}{dx_1} \cdot \frac{dx_1}{dt} + \frac{df}{dx_2} \cdot \frac{dx_2}{dt}$

$$= 2x_1 \cdot \cos t + 2 \cdot (-\sin t)$$

$$= 2\sin t \cdot \cos t - 2\sin t = 2\sin t(\cos t - 1)$$

3.



- $a = x^2$
- $b = e^a$
- $c = a + e^a$
- $d = \sqrt{c}$
- $e = \cos c$
- $f = \sqrt{c} + \cos c$

- $\frac{\partial a}{\partial x} = 2x$
- $\frac{\partial b}{\partial a} = e^a$
- $\frac{\partial c}{\partial a} = 1 + e^a$
- $\frac{\partial d}{\partial c} = \frac{1}{2\sqrt{c}}$
- $\frac{\partial e}{\partial c} = -\sin c$
- $\frac{\partial f}{\partial d} = 1 - 2d \cdot \sin d^2$

- $\frac{\partial f}{\partial c} = \frac{1}{2\sqrt{c}} - \sin c$
- $\frac{\partial f}{\partial b} =$
- $\frac{\partial f}{\partial a} =$
- $\frac{\partial f}{\partial x} =$

다음페이지

$$\frac{\partial f}{\partial b} = \frac{\partial f}{\partial c} \cdot \frac{\partial c}{\partial b} = \left(\frac{1}{2\sqrt{\ln b + b}} - \sin(\ln b + b)\right) \cdot \left(\frac{1}{b} + 1\right)$$

$$\frac{\partial (a + e^a)}{\partial e^a} = \frac{1}{a} + 1 = \frac{1}{\ln b} + 1 \qquad c = \ln b + b$$

$$\frac{\partial f}{\partial a} = \frac{\partial f}{\partial c} \cdot \frac{\partial c}{\partial a} = \left(\frac{1}{2\sqrt{c}} - \sin c\right)\left(1 + e^a\right)$$

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

$$\frac{\partial f}{\partial x} = \frac{\partial f}{\partial c} \cdot \frac{\partial c}{\partial a} \cdot \frac{\partial a}{\partial x} = \left(\frac{1}{2\sqrt{x^2 + e^{x^2}}} - \sin(x^2 + e^{x^2})\right)\left(1 + e^{x^2}\right) \cdot 2x$$