SC201 Assignment 1.

*4.1

$$\frac{d}{db}\sum_{i=1}^{m}(\phi x_i + b)^2$$

$$\Rightarrow \sum \frac{d}{db}(\phi x_i + b)^2 = \sum \frac{d}{db}(\phi^2 x_i^2 + 2\phi x_i b + b^2)$$

$$= \sum_{i=1}^{m}(2\phi x_i + 2b)$$

$$= 2\sum_{i=1}^{m}(\phi x_i + b) \quad *$$

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*4.2

$$\frac{d}{dh_i}\sum -\left(y_i \log h_i + (1-y_i)\log(1-h_i)\right)$$

$$\Rightarrow -\sum \frac{d}{dh_i}\left(y_i \log h_i + (1-y_i)\log(1-h_i)\right)$$

$$\Rightarrow -\sum\left(\frac{y_i}{h_i} + (1-y_i)\frac{-1}{(1-h_i)}\right)$$

$$= \sum\left(\frac{-y_i}{h_i} + \frac{1-y_i}{1-h_i}\right) \quad *.$$

※ 4.3 $\frac{d}{dx}\left(e^{1-x^2}\right)$

$= e^{1-x^2} \cdot (-2x)$ ※.

※ 4.4.

$$\frac{d}{dx}\left(\frac{1-3x^2}{1-x}\right) = \frac{d}{dx}(1-3x^2)(1-x)^{-1}$$

$$\Rightarrow (1-3x^2)(-1)(1-x)^{-2}(-1) + (-6x)(1-x)^{-1}$$

$$\Rightarrow \frac{(1-3x^2) + (-6x)(1-x)}{(1-x)^2}.$$

$$= \frac{1-3x^2-6x+6x^2}{(1-x)^2} = \frac{3x^2-6x+1}{(1-x)^2}$$ ※.