



$$da = d_{next-h} \cdot \frac{d \tanh(x)}{dx} \quad \text{where } x \text{ is } \tanh$$

$$= d_{next-h} \cdot (1 - x^2)$$

$$= d_{next-h} \cdot (1 - next-h^2) \quad \underline{\underline{eq. 1}}$$

$$\frac{d \omega x \cdot x}{dx} = \omega x \quad (D, H)$$

$$\therefore dx = da \cdot \omega x^T \quad (N, D) \quad (N, H) \quad (H, D) \quad \underline{\underline{eq\ 2}}$$

$$\frac{d \omega x \cdot x}{d \omega x} = x$$

$$\therefore d \omega x = x^T \cdot da \quad (D, H) \quad (D, N) \quad (N, H) \quad \underline{\underline{eq\ 3}}$$

$$\frac{d \text{prev-h} \cdot \omega_h}{d \text{prev-h}} = \omega_h \quad (H, H)$$

$$d \text{prev-h} = da \cdot \omega_h^T \quad (N, H) \quad (N, H) \quad (H, H) \quad \underline{\underline{eq\ 4}}$$

$$\frac{d \text{prev-h} \cdot \omega_h}{d \omega_h} = \text{prev-h} \quad (N, H)$$

$$\therefore d \omega_h = \text{prev-h}^T da \quad (H, H) \quad (H, N) \quad (N, H) \quad \underline{\underline{eq\ 5}}$$

$$db = \sum_{n=1}^N da \quad (H, I) \quad \underline{\underline{eq\ 6}}$$

