

$$\vec{a}^{(2)} = W^{(2)} \vec{a}^{(1)} + \vec{b}^{(2)} \quad \text{---(2)}$$

$$\vec{a}^{(3)} = W^{(3)} \vec{a}^{(2)} + \vec{b}^{(3)} \quad \text{---(3)}$$

sub (2) into (3)

$$\begin{aligned} \vec{a}^{(3)} &= W^{(3)} [W^{(2)} \vec{a}^{(1)} + \vec{b}^{(2)}] + \vec{b}^{(3)} \\ &= W^{(2)} W^{(3)} \vec{a}^{(1)} + W^{(3)} \vec{b}^{(2)} + \vec{b}^{(3)} \end{aligned}$$