

$$\begin{cases} \vec{a}^{(3)} = W^{(3)} W^{(2)} \vec{a}^{(1)} + W^{(3)} \vec{b}^{(2)} + \vec{b}^{(3)} \\ \vec{a}^{(1)} = W^{(1)} \vec{a}^{(0)} + \vec{b}^{(1)} \end{cases}$$

$$\Rightarrow \vec{a}^{(3)} = W^{(3)} W^{(2)} W^{(1)} \vec{a}^{(0)} + W^{(3)} W^{(2)} \vec{b}^{(1)} + W^{(3)} \vec{b}^{(2)} + \vec{b}^{(3)}$$

$$\vec{a}^{(3)} = \tilde{W} \vec{a}^{(0)} + \tilde{b}$$

$$\Downarrow$$

$$\begin{cases} \tilde{W} = W^{(3)} W^{(2)} W^{(1)} \\ \tilde{b} = W^{(3)} W^{(2)} \vec{b}^{(1)} + W^{(3)} \vec{b}^{(2)} + \vec{b}^{(3)} \end{cases}$$