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

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

$$\vec{a}^{(3)} = W_2^{(1)} \vec{a}^{(0)} + \vec{b}_2^{(1)}$$

$$W^{(3)} \left[ W^{(2)} \left( W^{(1)} \vec{a}^{(0)} + \vec{b}^{(1)} \right) + \vec{b}^{(2)} \right] + \vec{b}^{(3)} = W_2^{(1)} \vec{a}^{(0)} + \vec{b}_2^{(1)}$$

$$W^{(3)} \left[ W^{(2)} W^{(1)} \vec{a}^{(0)} + W^{(2)} \vec{b}^{(1)} + b^{(2)} \right] + b^{(3)} = W_2^{(1)} \vec{a}^{(0)} + \vec{b}_2^{(1)}$$

$$W^{(3)} W^{(2)} W^{(1)} \vec{a}^{(0)} + W^{(3)} W^{(2)} \vec{b}^{(1)} + W^{(3)} \vec{b}^{(2)} + \vec{b}^3 = W_2^{(1)} \vec{a}^{(0)} + \vec{b}_2^{(1)}$$

$$\Rightarrow \begin{cases} W_2^{(1)} = W^{(3)} W^{(2)} W^{(1)} \\ \vec{b}_2^{(1)} = W^{(3)} W^{(2)} \vec{b}^{(1)} + W^{(3)} \vec{b}^{(2)} + \vec{b}^{(3)} \end{cases}$$