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

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

sub (2) into (3)

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

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