Q2

For Network 1

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

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

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

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

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

For Network 2

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

So $\tilde{W} = W^{(3)} \cdot W^{(2)} \cdot W^{(1)}$

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

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