Vectorized form:

→ We'll basically need to stack together the computed z, a values.

$$Z = \begin{bmatrix} | & | & & | \\ z^{[1](1)} & z^{[1](2)} & \cdots & z^{[1](m)} \\ | & | & & | \end{bmatrix} \qquad \hat{y} = g(Z^{[4]}) = A^{[4]}$$

$$Z^{[l]} = W^{[l]} A^{[l-1]} + b^{[l]}$$

$$A^{[l]} = g^{[l]}(Z^{[l]})$$

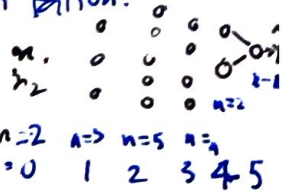
→ need for loop to compute activations for layer 1, 2, 3 ... n

for $l = 1 \ldots 4$:

Z_l, A_l ↕ Calculation needed.

Note on dimentions:

→ helpful to write the dims on paper before implementation.



eg ① $Z^{[1]} = W^{[1]} \cdot X + b^{[1]}$

$(3,1) \quad (3,2) \quad (2,1) \quad (3,1)$

$\begin{bmatrix} \vdots \end{bmatrix} = \begin{bmatrix} \vdots \end{bmatrix} \begin{bmatrix} \vdots \end{bmatrix}$

$[n^{[1]}, 1] \quad [n^{[1]}, n^{[0]}] \quad (n^{[0]}, 1)$

② $W^{[1]} : (n^{[1]}, n^{[0]})$

$W^{[2]} : (5,3) \quad (n^{[2]}, n^{[1]})$

③ $Z^{[2]} = W^{[2]} \cdot a^{[1]} + b^{[2]}$

$(5,1) \quad (5,3) \quad (3,1) \quad (5,1)$

④ Similarly,

$W^{[3]} : (4,5)$

$W^{[4]} : (2,4)$

$W^{[5]} : (1,2)$

Generic form:

$W^{[l]} : (n^{[l]}, n^{[l-1]})$ - dw has same dims

$b^{[l]} : (n^{[l]}, 1)$ db has same dims

$Z^{[l]}, a^{[l]} : (n^{[l]}, 1)$

$Z^{[l]}, A^{[l]} : (n^{[l]}, m)$ $dZ^{[l]}, dA^{[l]}$ have same dims