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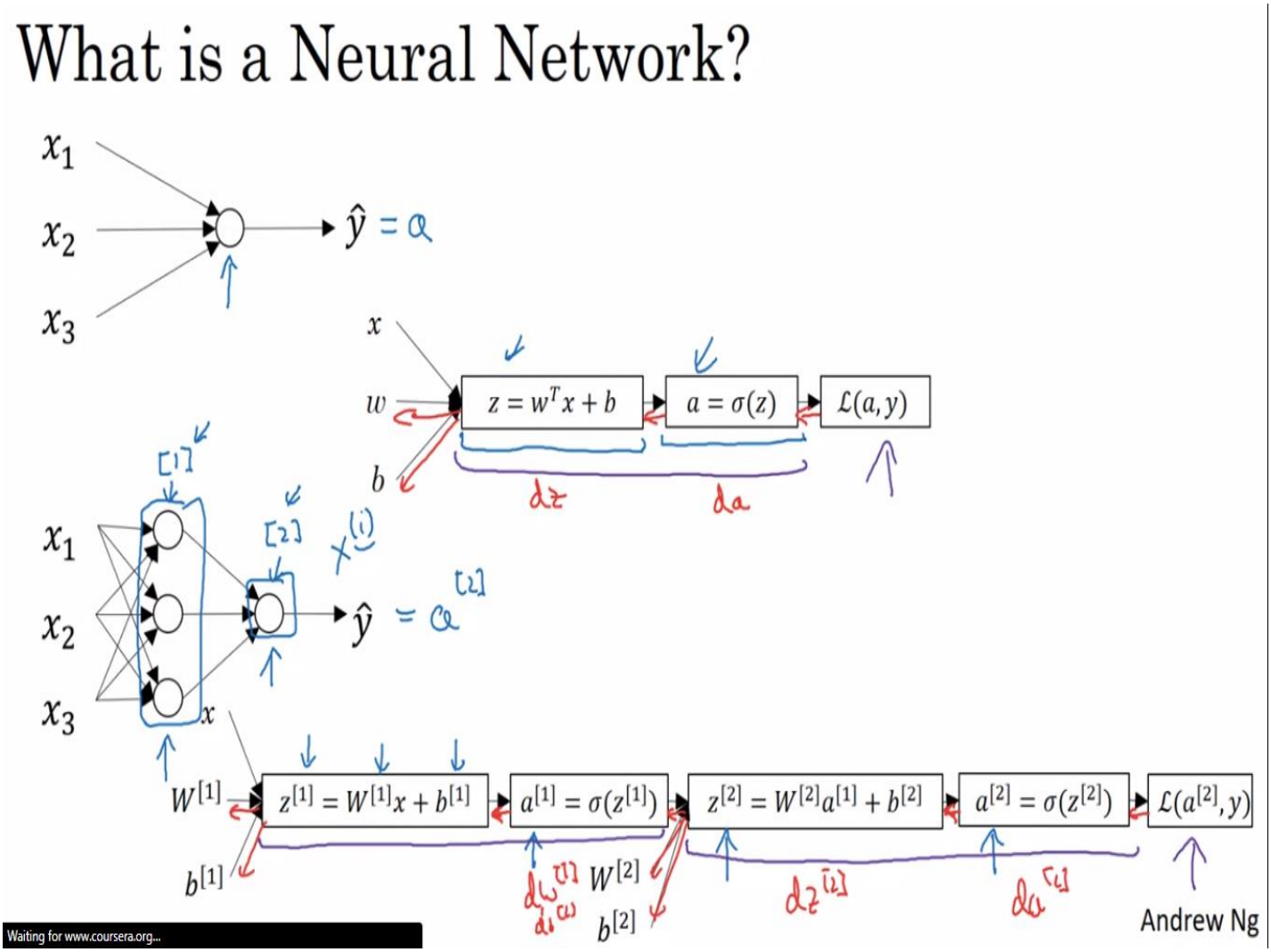
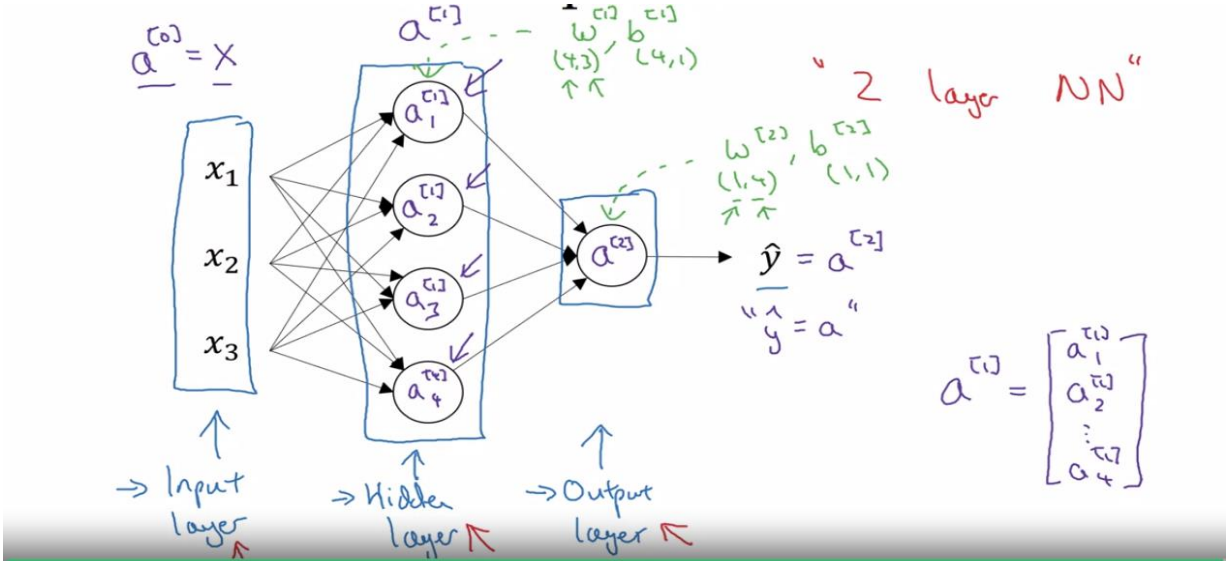
WEEK 3

NEURAL NETWORKS AND DEEP LEARNING

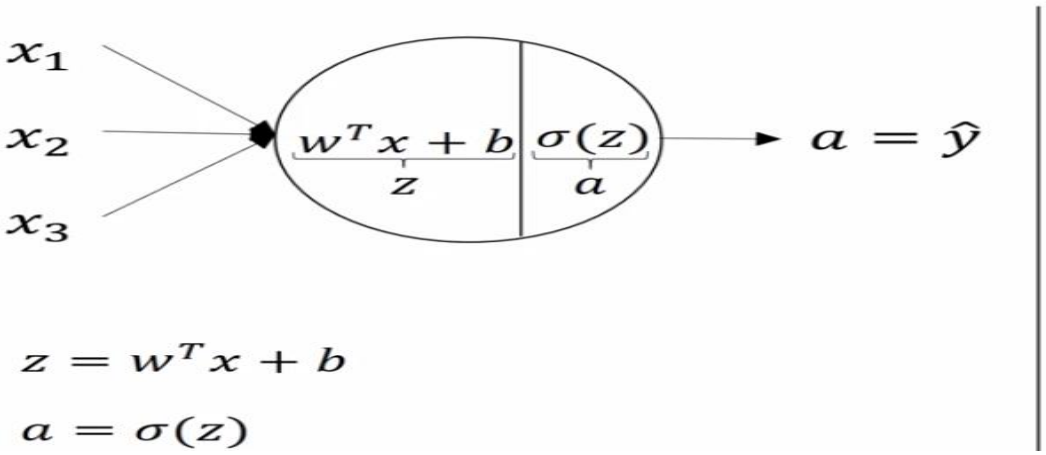
- X_1 ,X_2, X_3 are the input layers which are given the index 0.
- Next we have the hidden layers having index 1.
- Lastly we have the Output layer having index 2 which predicts the $\hat{y}$.
- This is a 2 layer Neural Network.



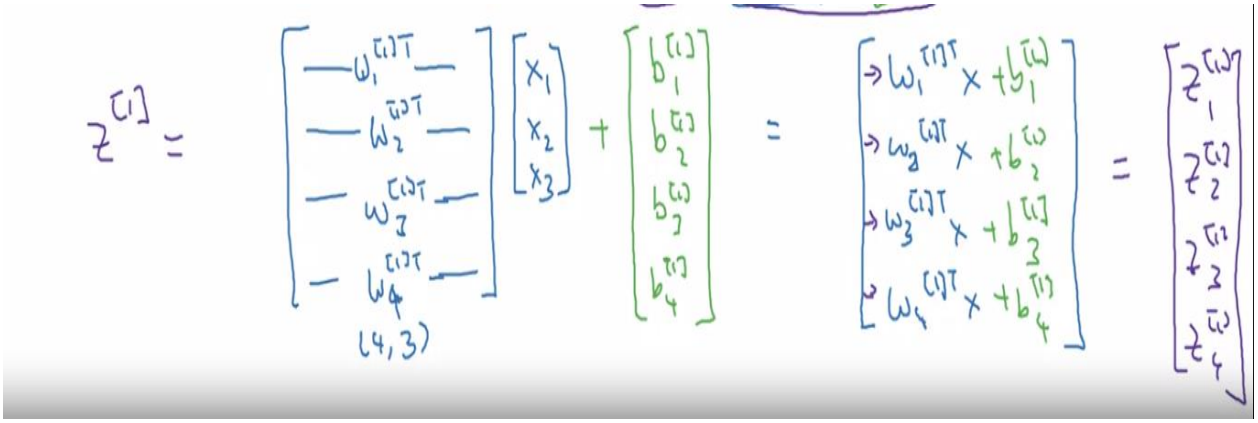
NEURAL NETWORK REPRESENTATION



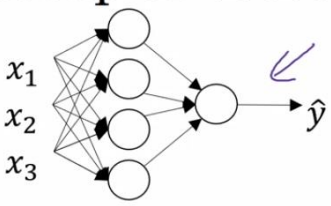
- Each hidden layer has two partitions. One has the Z value $Z=w^T x + b$ and the next one is A which is the activation function. A=sigmoid(z)



- The left layer denotes: $Z^{[1]}_1 = W^{[1]T}_1 X + b^{[1]}_1$
- The right layer denotes $A^{[1]}_1 = \sigma(Z^{[1]}_1)$
- The superscript denotes the layer number whereas the subscript denotes the node in that layer.



Recap of vectorizing across multiple examples



$$X = \begin{bmatrix} | & | & & | \\ x^{(1)} & x^{(2)} & \cdots & x^{(m)} \\ | & | & & | \end{bmatrix}$$

$$A^{[1]} = \begin{bmatrix} | & | & & | \\ a^{[1](1)} & a^{[1](2)} & \cdots & a^{[1](m)} \\ | & | & & | \end{bmatrix}$$

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for i = 1 to m
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$$z^{[1](i)} = W^{[1]}x^{(i)} + b^{[1]}$$
$$a^{[1](i)} = \sigma(z^{[1](i)})$$
$$z^{[2](i)} = W^{[2]}a^{[1](i)} + b^{[2]}$$
$$a^{[2](i)} = \sigma(z^{[2](i)})$$

$$Z^{[1]} = W^{[1]}X + b^{[1]}$$
$$A^{[1]} = \sigma(Z^{[1]})$$
$$Z^{[2]} = W^{[2]}A^{[1]} + b^{[2]}$$
$$A^{[2]} = \sigma(Z^{[2]})$$