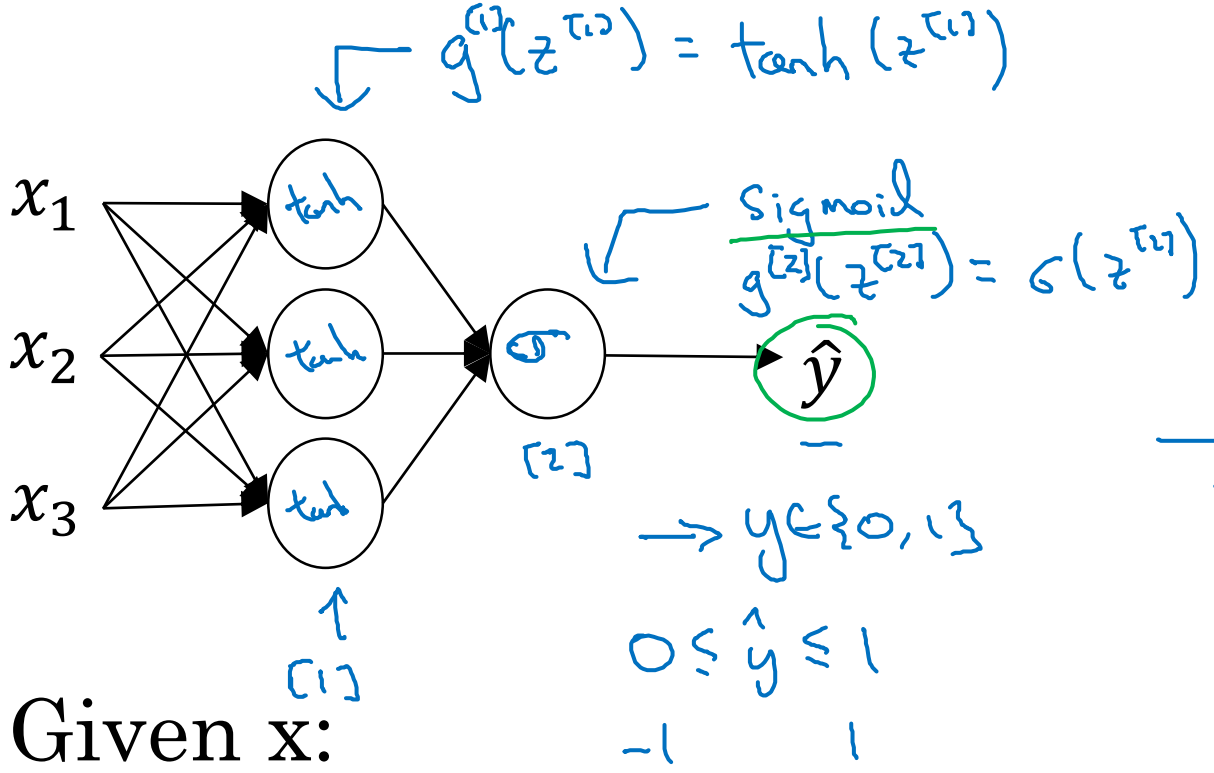
deeplearning.ai

One hidden layer Neural Network

Activation functions

Activation functions



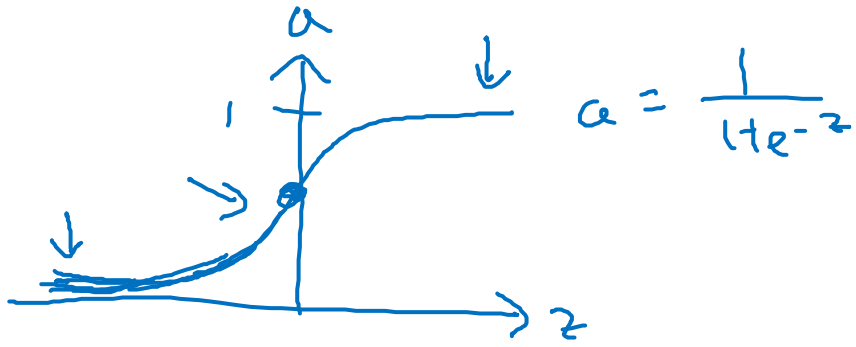
$g^{[1]}(z^{[1]}) = \tanh(z^{[1]})$

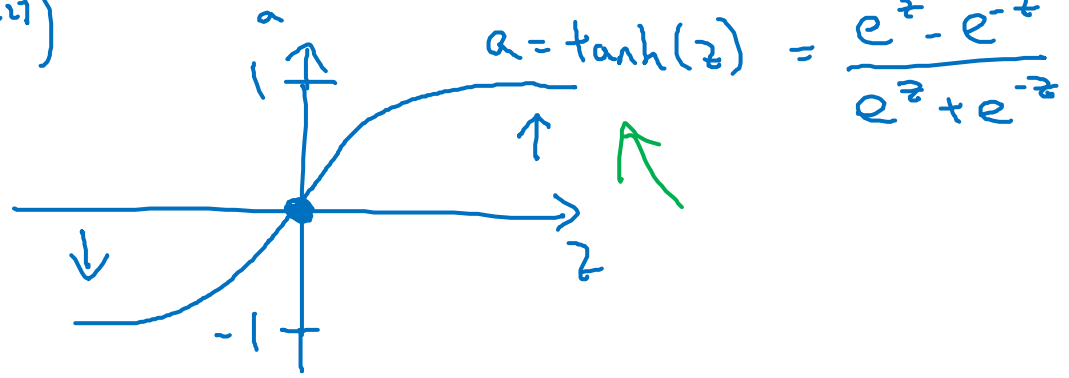
Sigmoid
$g^{[2]}(z^{[2]}) = \sigma(z^{[2]})$

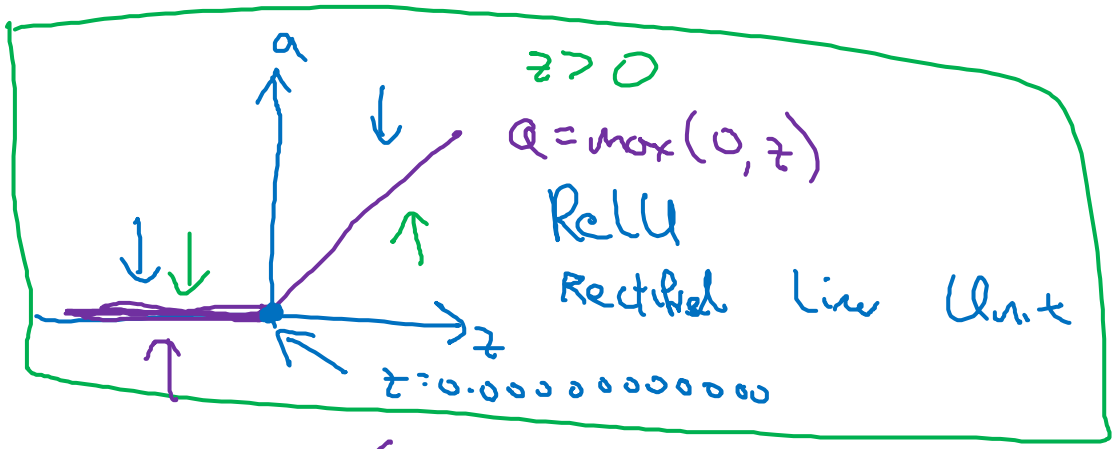
$\rightarrow y \in \{0, 1\}$

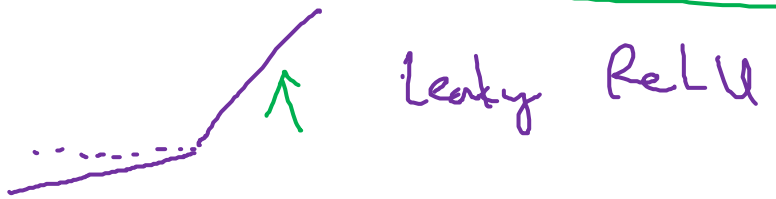
$0 \le \hat{y} \le 1$

$-1 \quad 1$









Given x:

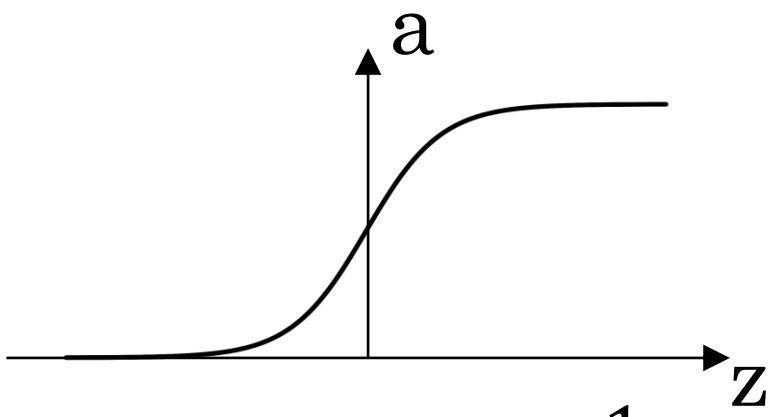
$$z^{[1]} = W^{[1]}x + b^{[1]}$$

$$a^{[1]} = \sigma(z^{[1]}) \quad g^{[1]}(z^{[1]})$$

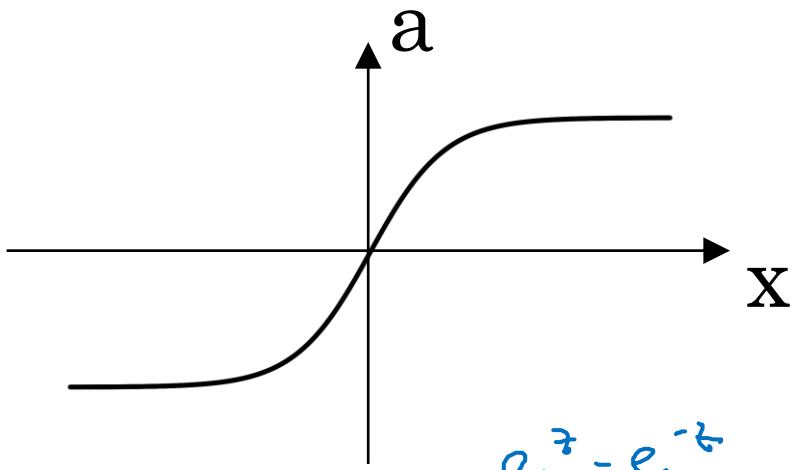
$$z^{[2]} = W^{[2]}a^{[1]} + b^{[2]}$$

$$a^{[2]} = \sigma(z^{[2]}) \quad g^{[2]}(z^{[2]})$$

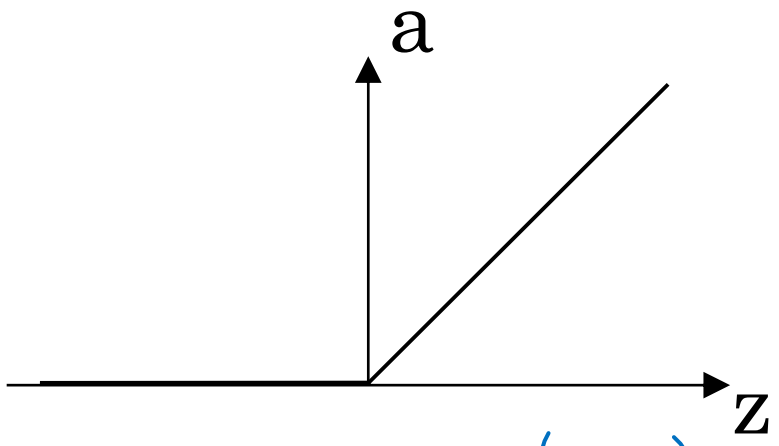
Pros and cons of activation functions



sigmoid: $a = \dfrac{1}{1+e^{-z}}$

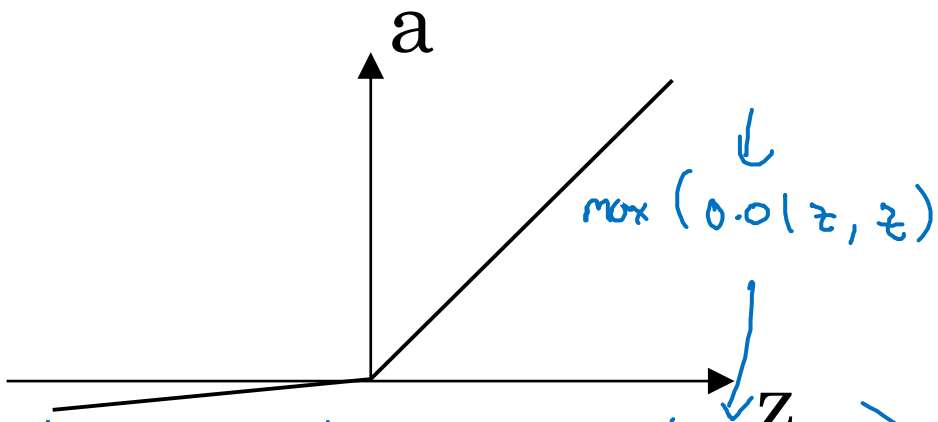


tanh: $a = \dfrac{e^{z}-e^{-z}}{e^{z}+e^{z}}$



ReLU $a = \max(0, z)$

to prevent the slope from approximating 0



Leaky ReLU $a = \max(0.01z, z)$