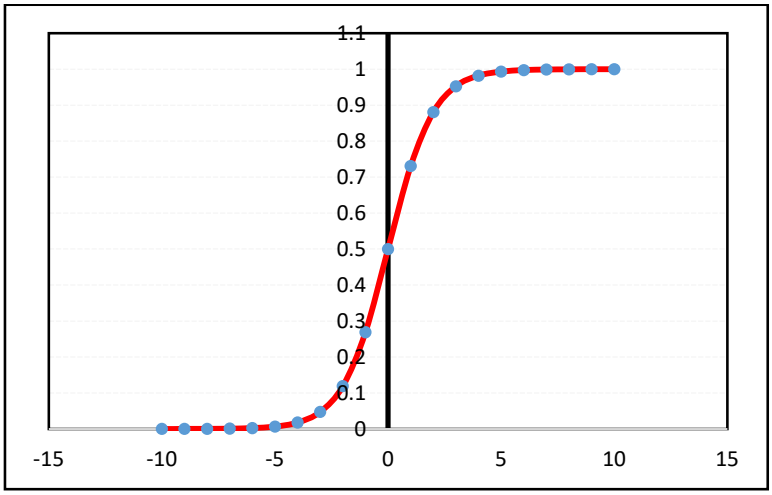
Activation Functions:

1. Sigmoid function

$$\sigma = {}^{1}/_{(1+e^{-x})}$$

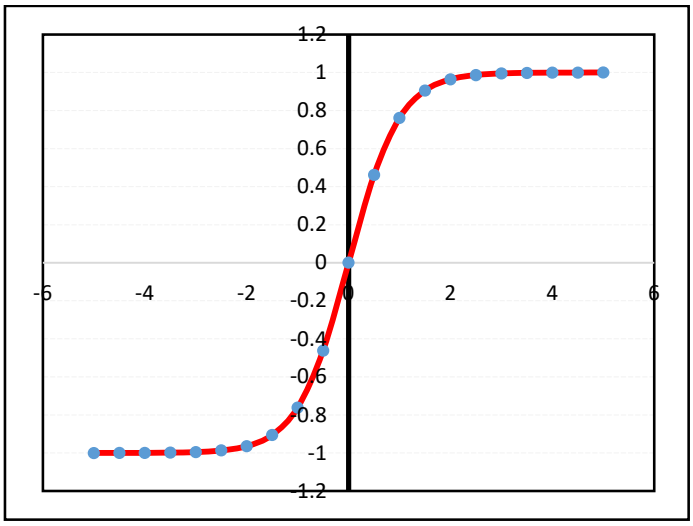
σ ranges from (0, 1).
When the input is negative, is close to 0.
When is positive, is close to 1.
At x = 0, σ = 0.5



2. tanh function

$$\tanh(x) = {(e^{x} - e^{-x})}\Big/{(e^{x} + e^{-x})}$$

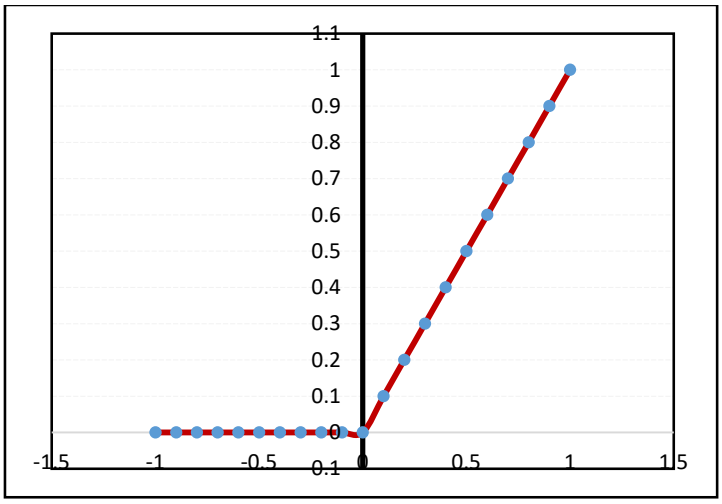
tanh(x) ranges from (-1, 1).
At x = 0, tanh(x) = 0



3. ReLU function

$f(x) = \max(0, x)$

$$f(x) = \begin{cases} 0 \; if \; x \leq 0 \\ x \; if \; x \; > 0 \end{cases}$$

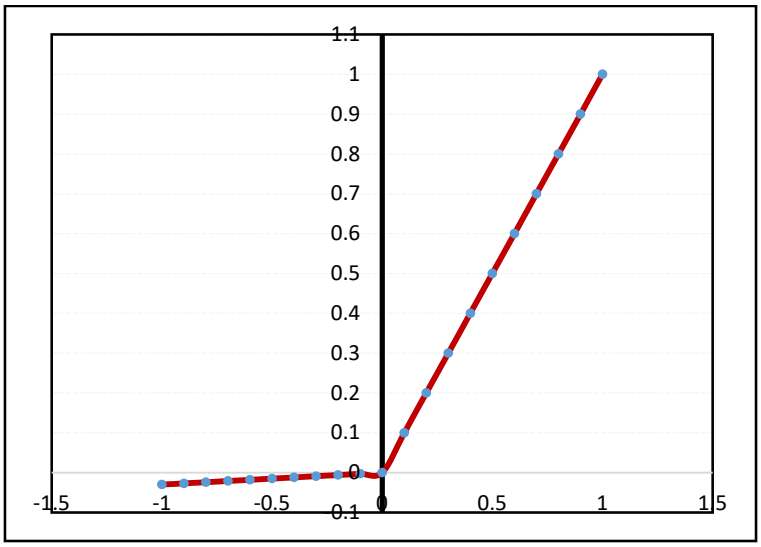


4. Leaky ReLU

$$f(x) = \max(\alpha x, x)$$

$$f(x) = \begin{cases} \alpha x \; if \; x \leq 0 \\ x \; if \; x \; > 0 \end{cases}$$

A represent the very small constant, for an example, 0.03



5. SoftMax

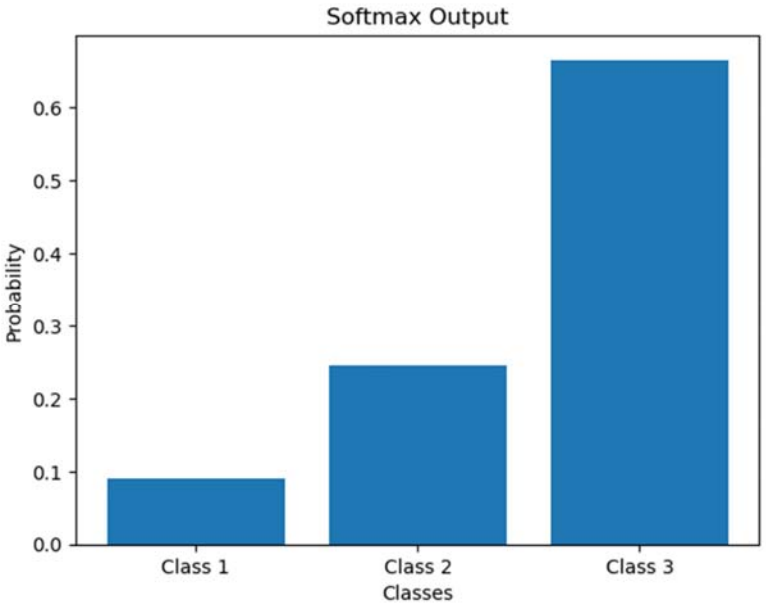
$$\sigma(x)_i = {e^{x_i}}/{\sum_{n=1}^{n} e^{x_n}}$$

x = [1.0, 2.0, 3.0]

exp(x) = [2.718, 7.389, 20.086]

sum(exp(x)) = 30.193

σ(x) = [0.090, 0.245, 0.665]



6. Exponential Linear Unit (ELU)

α > 0

$$f(x) = \begin{cases} x \; if \; x > 0 \\ \propto (e^x - 1) \; if \; x \leq 0 \end{cases}$$