Activation functions apply a
nonlinear transformation
and decide whether a
neuron should be activated or not.

Activation Functions

Step Function

Sigmoid

TanH

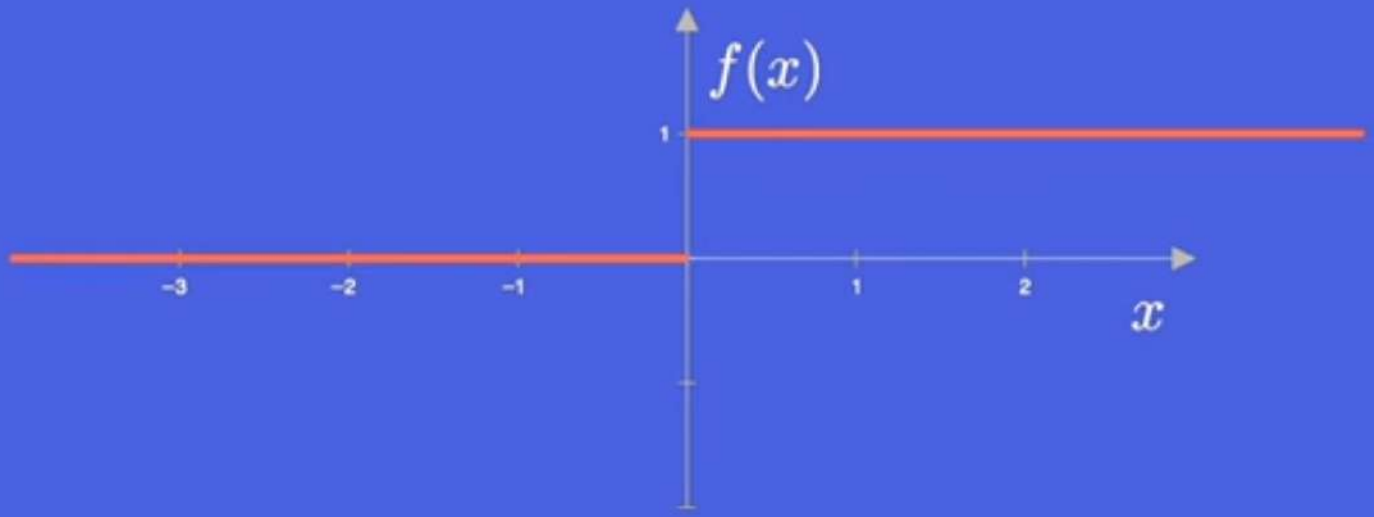
ReLU

Leaky ReLU

Softmax

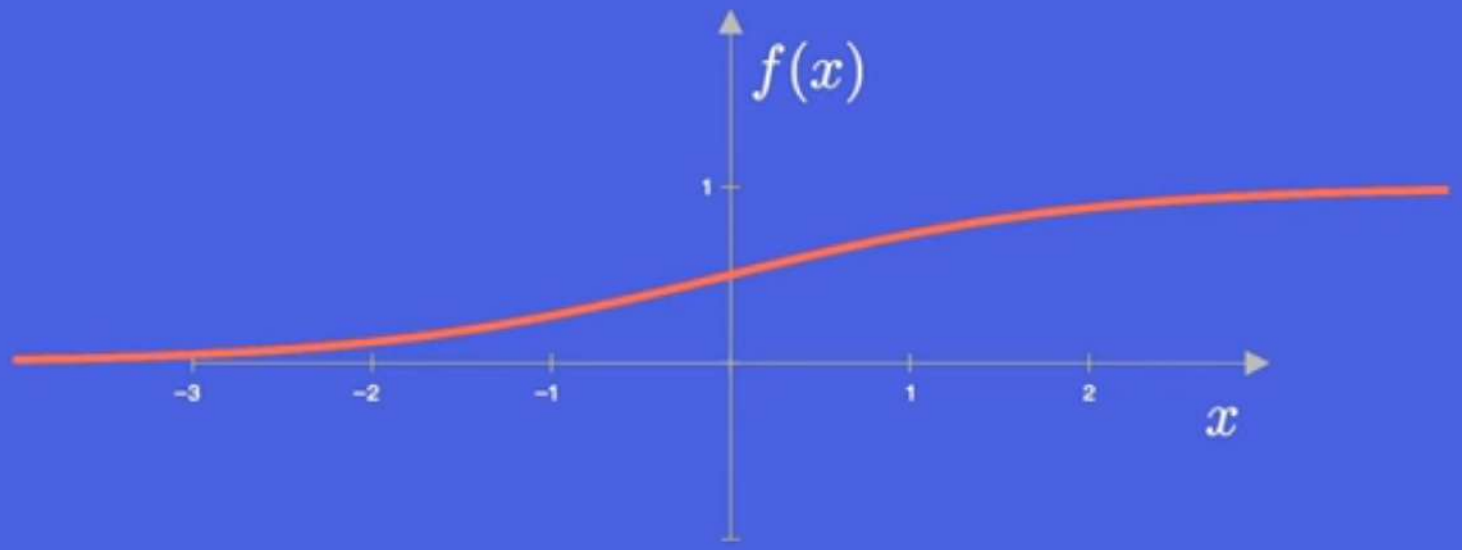
Step Function

$$f(x) = \begin{cases} 1 \ \ if \ \ x \geq \theta \\ 0 \ \ otherwise \end{cases}$$



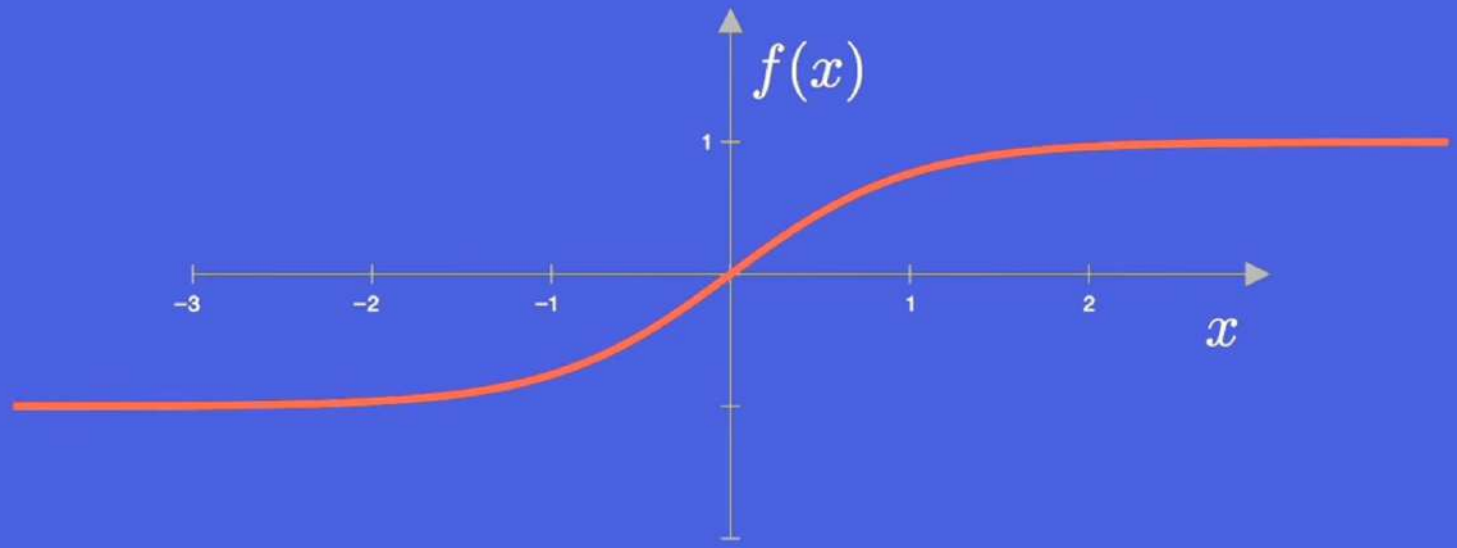
Sigmoid

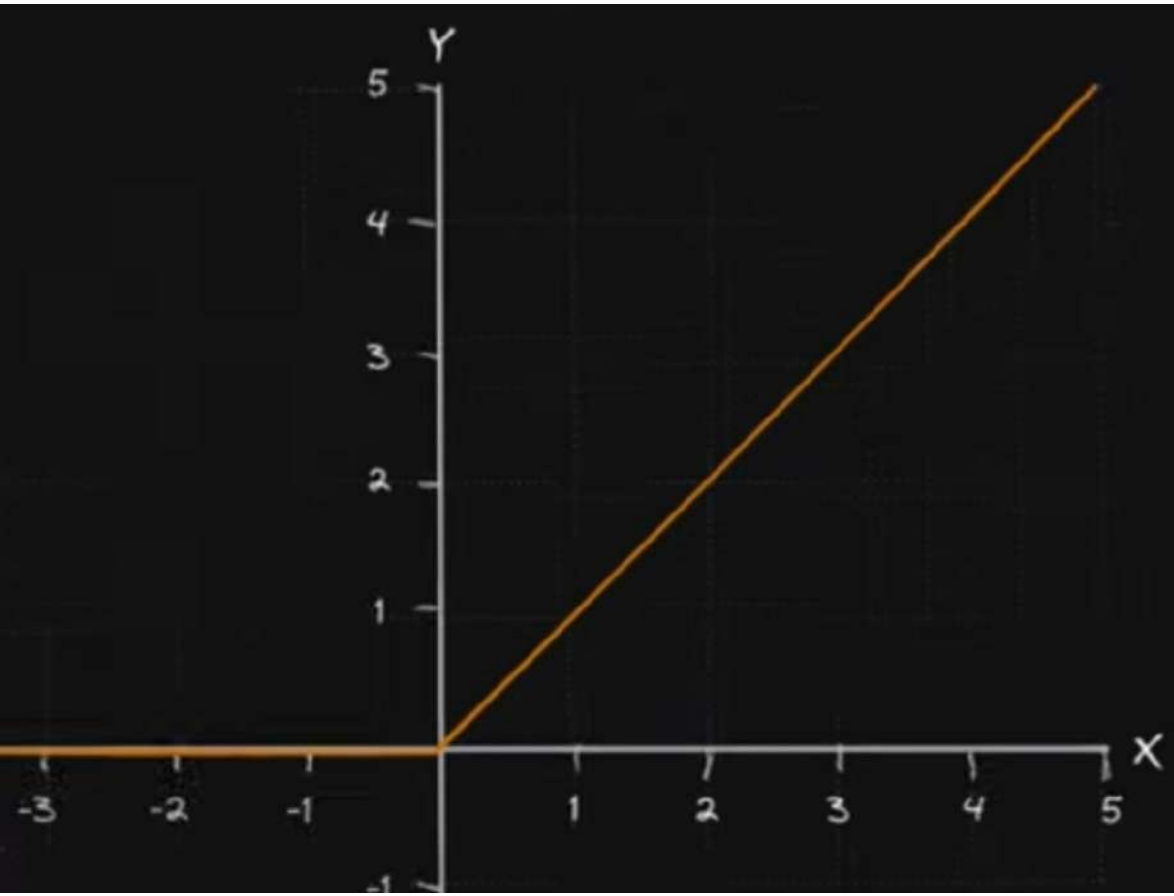
$$f(x) = \frac{1}{1+e^{-x}}$$



TanH

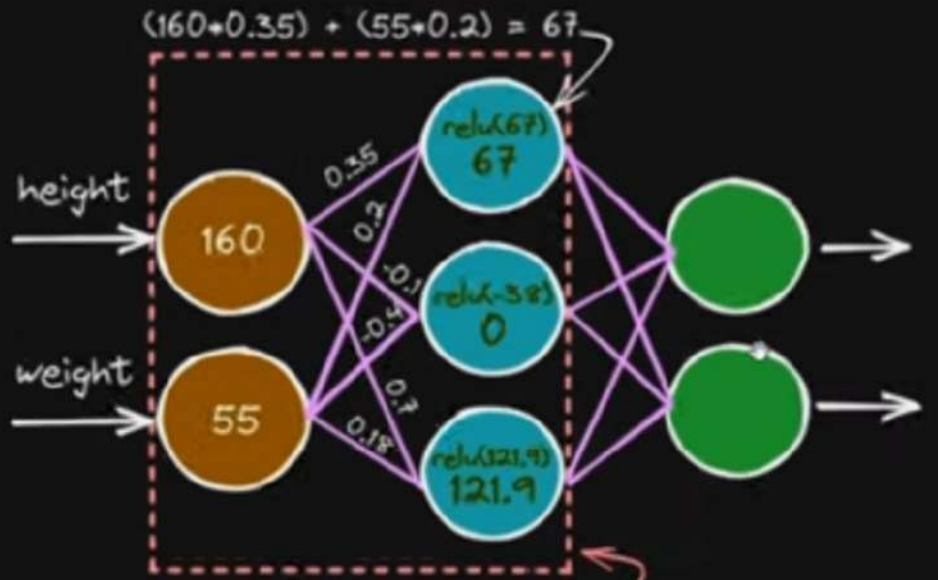
$$f(x) = \frac{2}{1+e^{-2x}} - 1$$





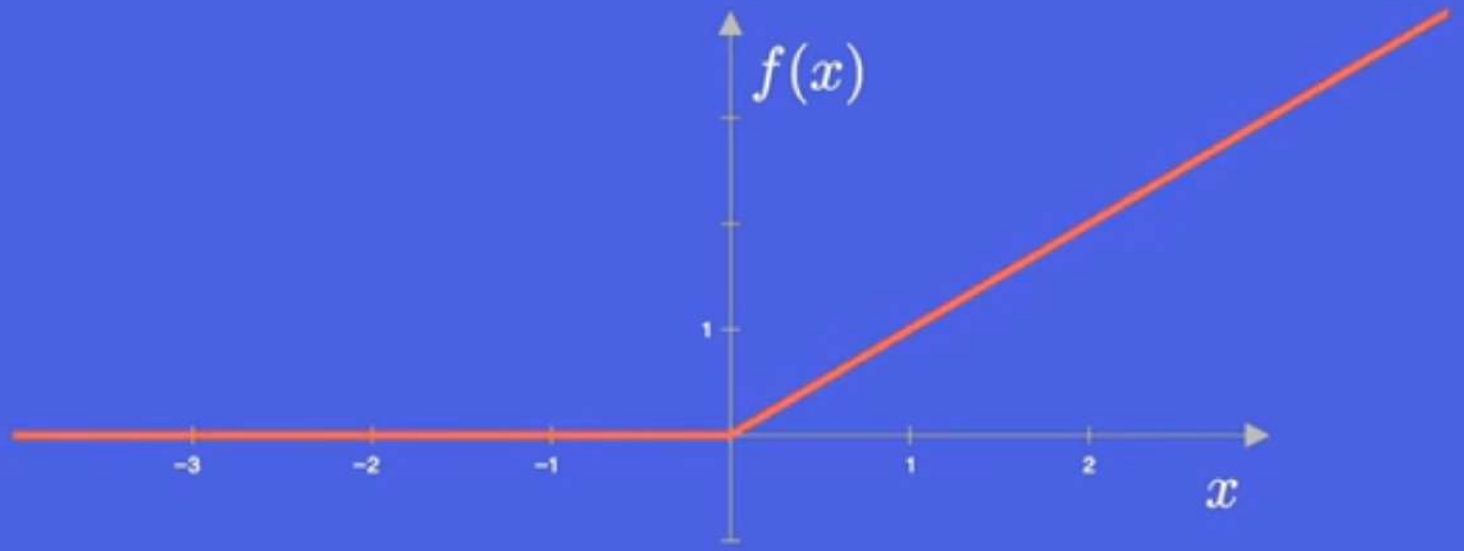
Values less than or equal to 0: 0

Values greater than 0: The input value



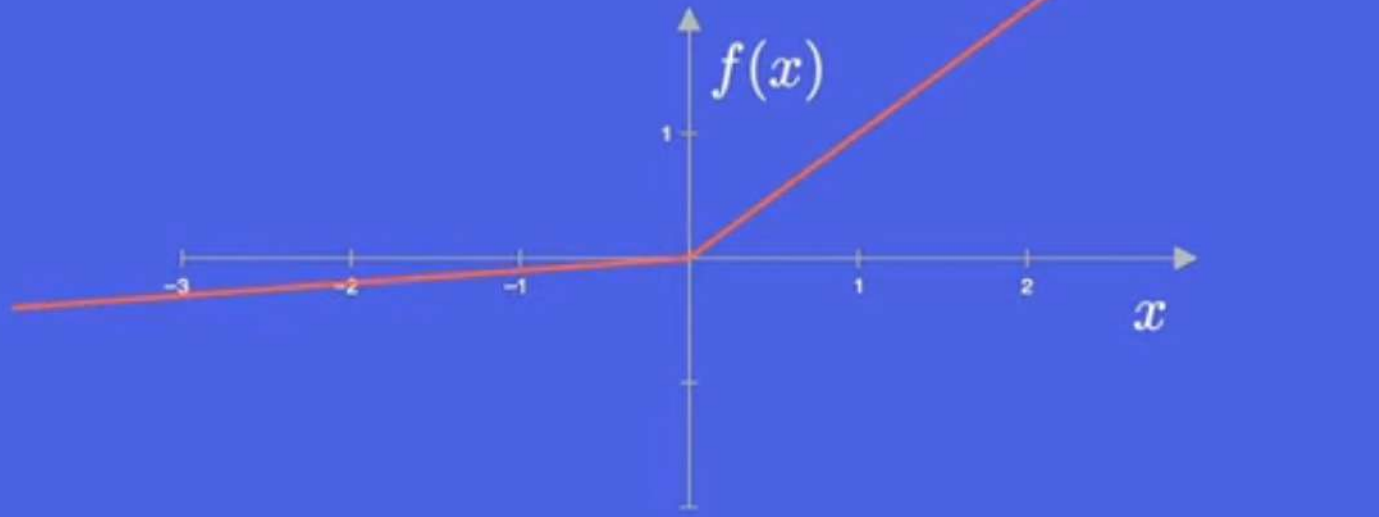
ReLU

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



Leaky ReLU

$$f(x) = \begin{cases} x & if \quad x \geq 0 \\ a \cdot x & otherwise \end{cases}$$



Softmax

$$S(y_i) = \frac{e^{y_i}}{\sum e^{y_i}}$$

Softmax

Dog p_1

e p_2

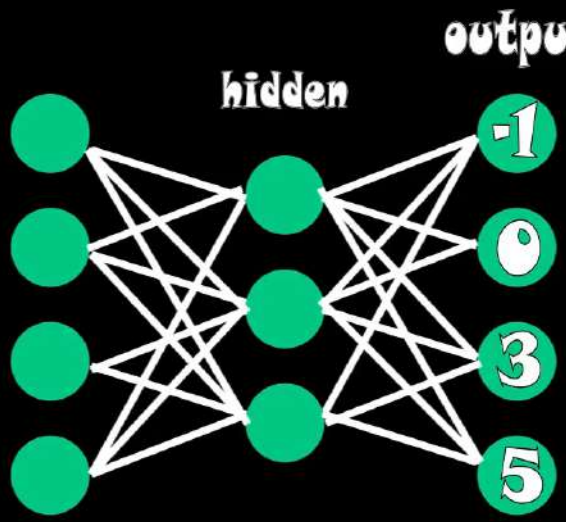
se p_3

ar p_4

$= 1$

Softmax

$$f(y_i) = \frac{e^{y_i}}{\sum_k e^{y_k}}$$



$p_1 = 0.002$

$p_2 = 0.006$

$p_3 = 0.118$

$p_4 = 0.874$

Softmax

1 - Softmax function converts real values into probabilities.

2 - It only used as output layer of neural network.

3 - You can consider higher probability as actual output.