

1819-108-W10-REBCO4

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- *The sigmoid function (or logistic)*

$$\varphi(x) = \frac{1}{1 + \exp(-x)}.$$

- *The hyperbolic tangent function ("tanh")*

$$\varphi(x) = \frac{\exp(x) - \exp(-x)}{\exp(x) + \exp(-x)} = \frac{\exp(2x) - 1}{\exp(2x) + 1}.$$

- *The hard threshold function*

$$\varphi_{\beta}(x) = 1_x \geq \beta.$$

- *The Rectified Linear Unit (ReLU) activation function*

$$\varphi(x) = \max(0, x).$$

Here is a schematic representation of an artificial neuron where  $\sum = \langle w_j, x \rangle + b_j$ .