

# Iesildiishanaas

Daniels Tomsons

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- The sigmoid function (or logistic)

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

- The hyperbolic tangent function ("tanh")

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

- The hard threshold function

$$\phi\beta(x) = 1_{x \geq \beta}.$$

- The Rectified Linear Unit (ReLU) activation function

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

Here is a schematic representation of an artificial neuron where  $\sum = (\omega_j, x) + b_j$