Artificial neuron for use in binary classification

$X \in \mathbb{R}^{N \times m}$

m = # input features
N = # samples
i = instance/sample

$Y = \{-1, +1\}$

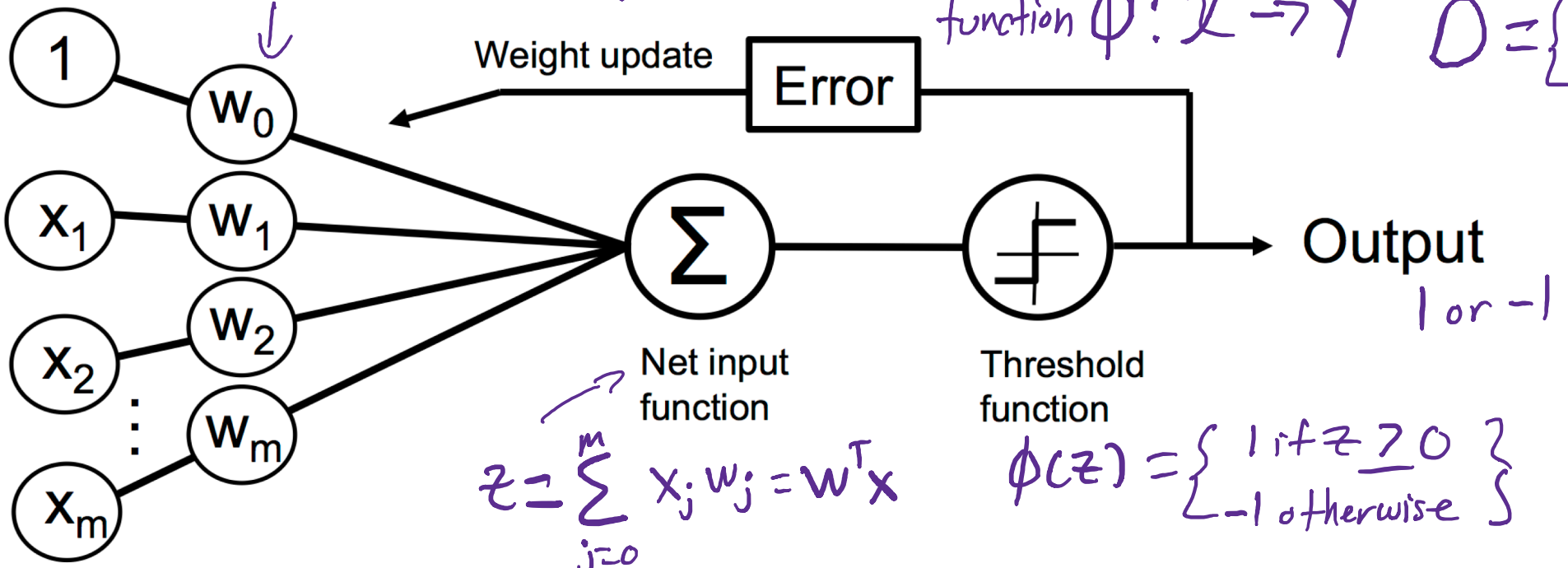
function $\phi : X \to Y$

$D = \{(x^{(i)}, y^{(i)})\}_{i=1}^{N}$

$x^{(i)} = (x_0 = 1, x_1, \ldots, x_m)$

weights

$w = (w_0, w_1, \ldots, w_m) \in \mathbb{R}^{m+1}$



$$z = \sum_{j=0}^{m} x_j w_j = w^T x$$

$$\phi(z) = \begin{cases} 1 \text{ if } z \geq 0 \\ -1 \text{ otherwise} \end{cases}$$

bias unit : $w_0 = -\theta$ ← from threshold function

- allows classifier to shift decision boundary left or right