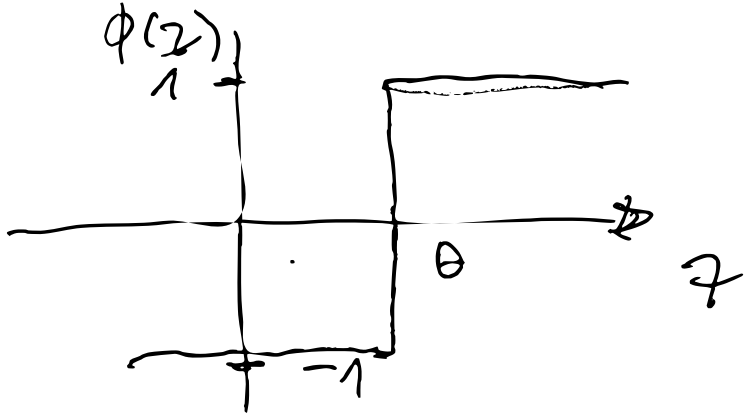
$$z^{(i)} = w_1 x_1^{(1)} + w_2 x_2^{(1)} + \dots + w_m x_m^{(1)}$$

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



$$z \geq \theta$$

$$w_1 x_1 + w_2 x_2 + \dots + w_m x_m \geq \theta$$

$$-\theta + w_1 x_1 + w_2 x_2 + \dots + w_m x_m \geq 0$$

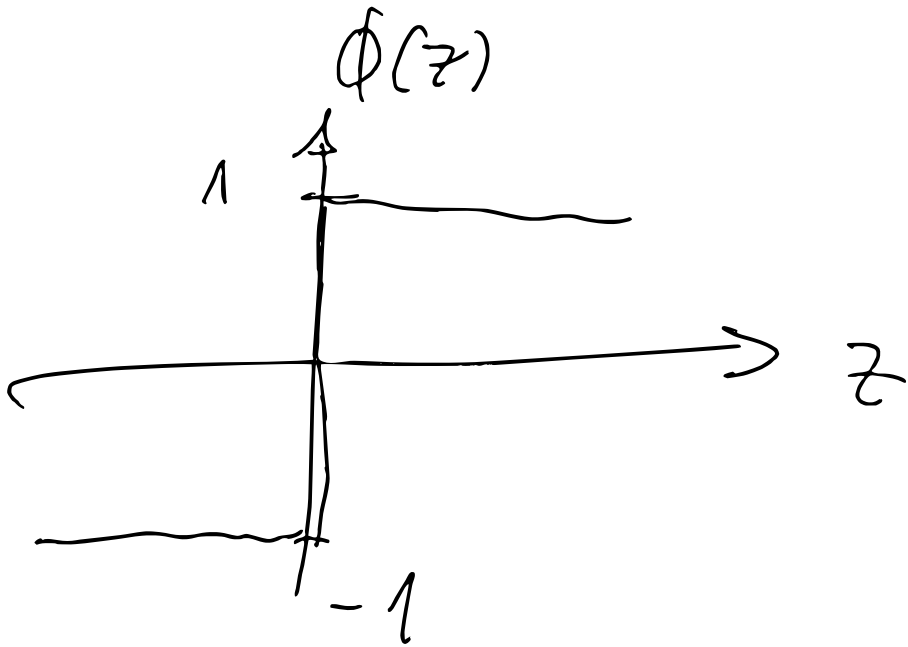
$$-\theta \cdot 1 + w_1 x_1 + w_2 x_2 + \dots + w_m x_m \geq 0$$

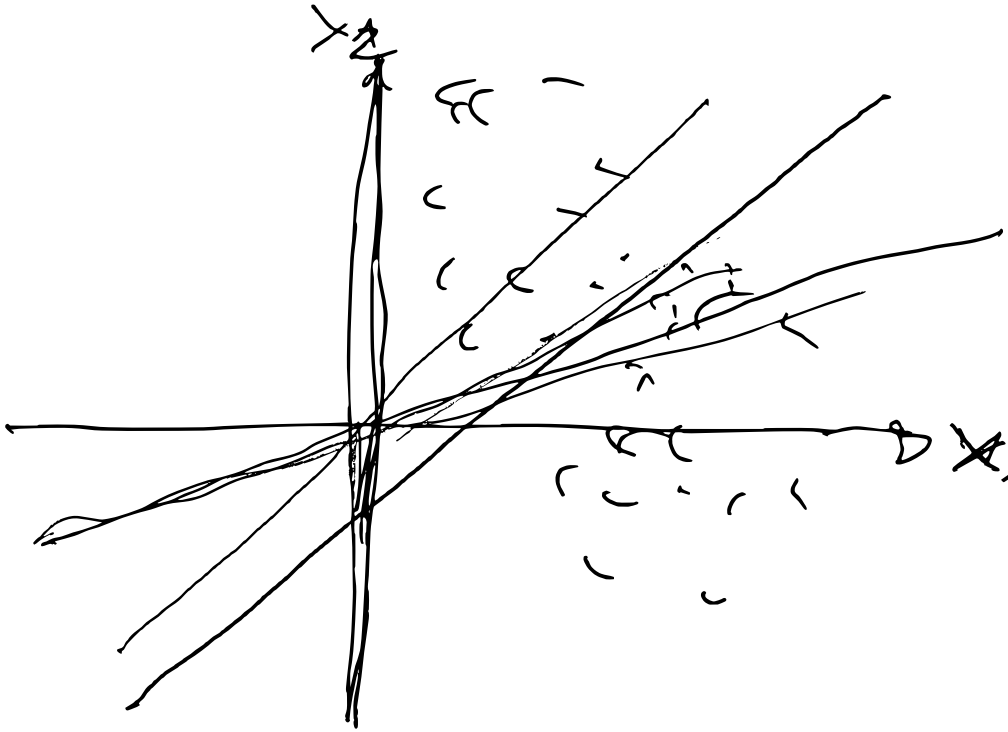
$$w_0 = -\theta$$

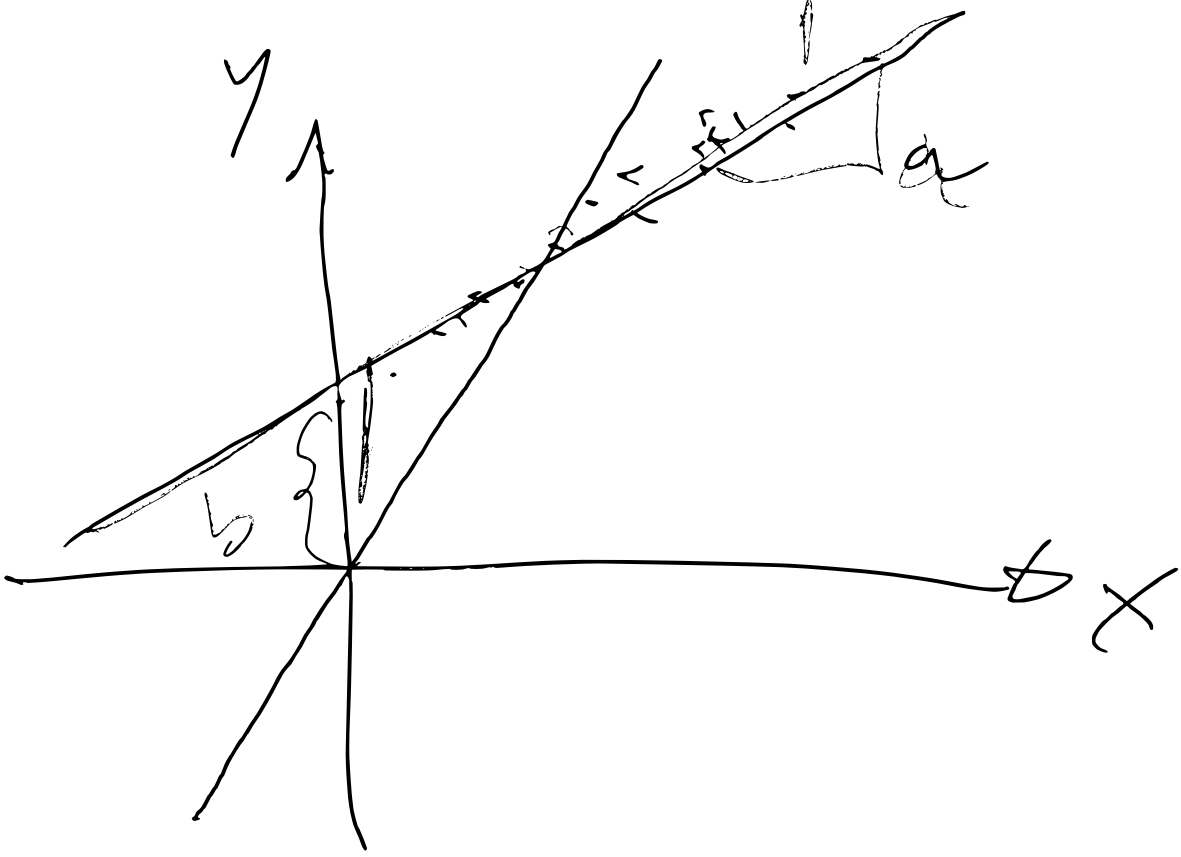
$$x_0 = 1$$

$$w_0 x_0 + w_1 x_1 + w_2 x_2 + \dots + w_m x_m \geq 0$$

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







$y = ax + b$

We

$$w_j := w_j + \Delta w_j$$

$$\Delta w_j = \eta (y^{(i)} - \hat{y}^{(i)}) x_j^{(i)}$$