

$$w_1 x_1 + w_2 x_2 + w_3 x_3 + b = 0$$

$$w^T x + b = 0$$

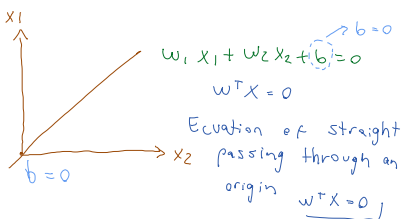
$$w = \begin{bmatrix} w_1 \\ w_2 \\ w_3 \end{bmatrix} \rightarrow w^T = [w_1 \ w_2 \ w_3] \quad w = \begin{bmatrix} w_1 \\ w_2 \\ w_3 \end{bmatrix} \cdot x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

$$w^T x = [w_1 \ w_2 \ w_3] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = (w_1 \cdot x_1) + (w_2 \cdot x_2) + (w_3 \cdot x_3)$$

n-dimension plane

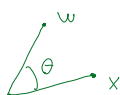
$$w_1 x_1 + w_2 x_2 + \dots + w_n x_n + b = 0$$

$$w^T x + b = 0$$



$$\text{Equation of a plane} = \hat{n} : w^T x = 0$$

$$\begin{bmatrix} w_1 \\ w_2 \\ w_3 \\ \vdots \\ w_n \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}$$



$$w \cdot x = w^T x = \|w\| \|x\| \cos \theta = 0$$

$$\theta = 90^\circ \quad \cos \theta = 0$$

