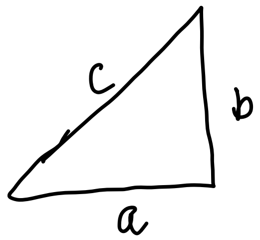
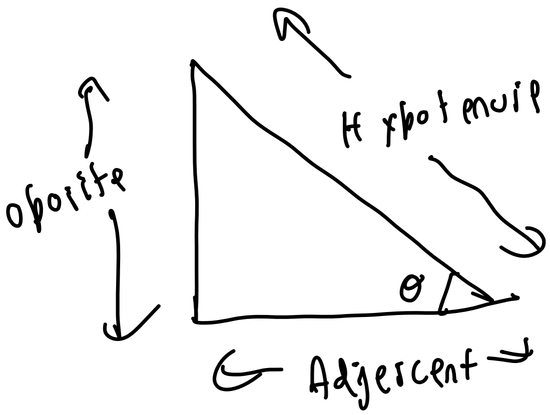


$$c^2 = a^2 + b^2$$
$$c = \sqrt{a^2 + b^2}$$



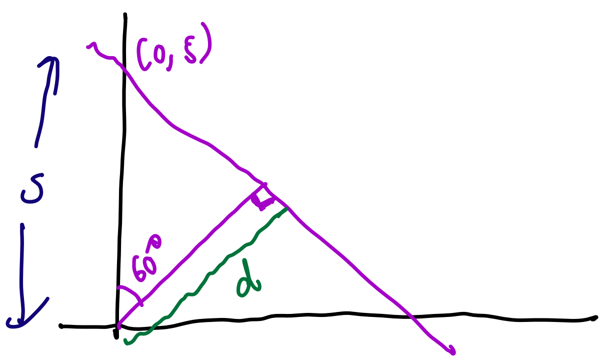
$$\cos\theta = \frac{A}{H}$$

$$\sin\theta = \frac{O}{H}$$

$$\tan\theta = \frac{O}{A}$$

	0°	30°	45°	60°	90°
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0

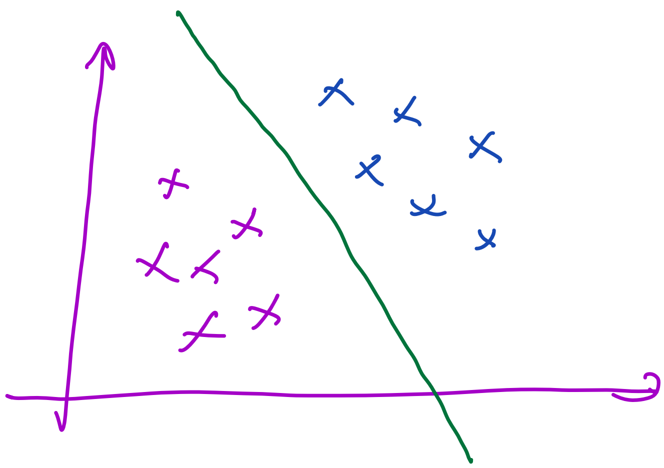
$\theta \Rightarrow$



$$\cos 60^\circ = \frac{d}{5}$$

$$\frac{1}{2} * 5 = d = 2.5$$

Recap



$$y = mx + c$$

$$ax + by + c = 0$$

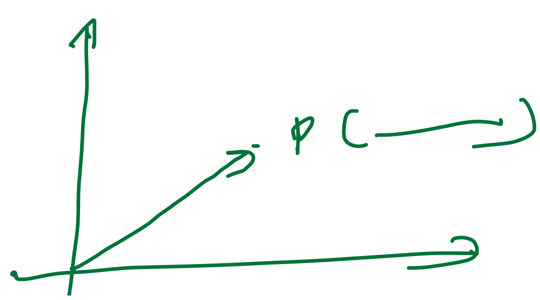
$$w_1 x_1 + w_2 x_2 + \ldots \ldots + w_n x_n + w_0 = 0$$

$$\Downarrow$$

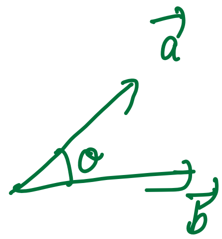
$$w^T \cdot x + w_0 = 0$$

norm $= \|\vec{x}\|$

$\Rightarrow \sqrt{\Sigma x_i^2}$



$$\cos\theta = \frac{\vec{a}\cdot\vec{b}}{\|a\|\,\|b\|}$$



Q ⇒ Does the point (4, 13) belong to th line $3x - y + 7 = 0$

$3 * 4 - 13 + 7$

$12 - 13 + 7 \neq 0$

Intersection of 2 lines

$3x - y + 7 = 0 \Rightarrow y = 3x + 7$

$2x + 2y = 0 \Rightarrow y = -x$

$3x + 7 = -x$

$4x = -7$

$x = -\frac{7}{4} = -1.75$

$y = -x$

$y = 1.75$

Q ⇒ Find the point of intersection

$x = y \qquad x + y + 2 = 0$

$$y + y + 2 = 0$$
$$2y + 2 = 0$$
$$y + 1 = 0$$
$$y = -1$$
$$x = -1$$

Geometric meaning of $\vec{w}$

Hyperplane : $w^T x + w_0 = 0$

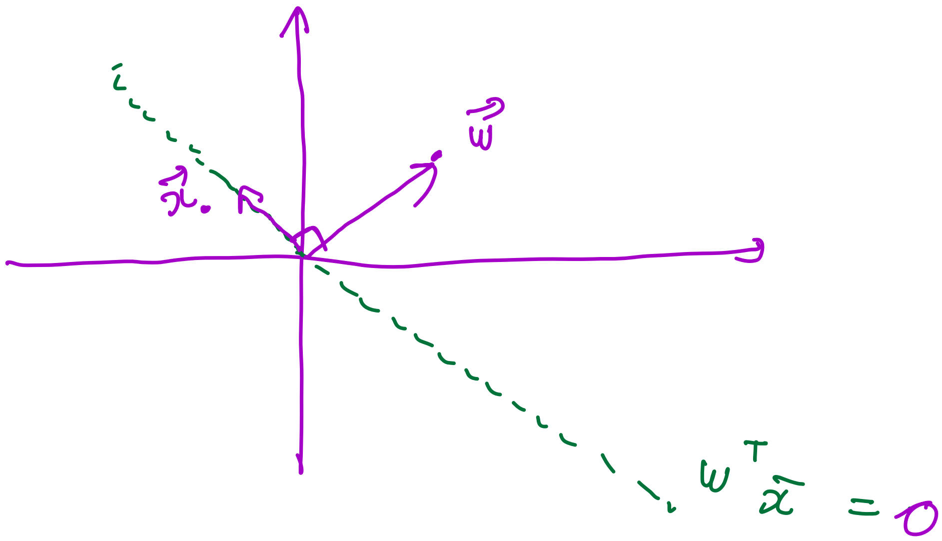
$$w_1 x_1 + w_2 x_2 + \cdots + w_n x_n + w_0 = 0$$

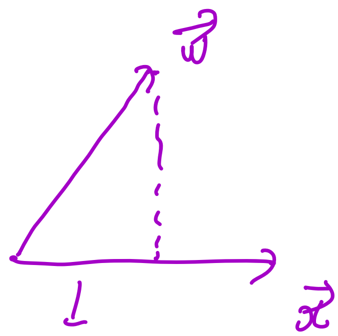
axes

Coeff

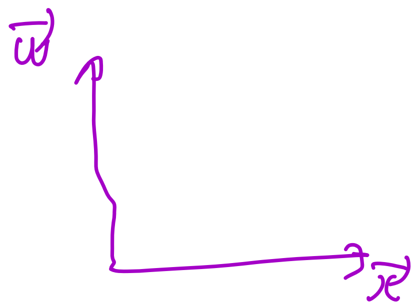
$\vec{x}_1 = [x_1, x_2]$

$\vec{w} \Rightarrow [w_1, w_2]$



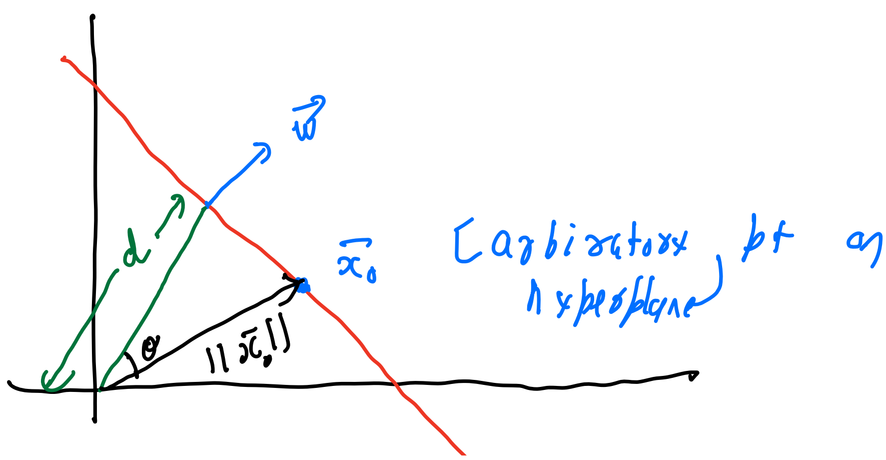


$$\frac{\vec{w} \cdot \vec{x}}{\|x\|}$$



$w \perp x$

⇒ Distance of a hyperplane from origin



$w^T x + w_0 = 0$

$w^T x + w_0 = 0$

$w^T x = -w_0$ ——— ①

$$\cos\theta = \frac{d}{\|x_0\|}$$

$$d = \|x_0\| \cdot \cos\theta$$

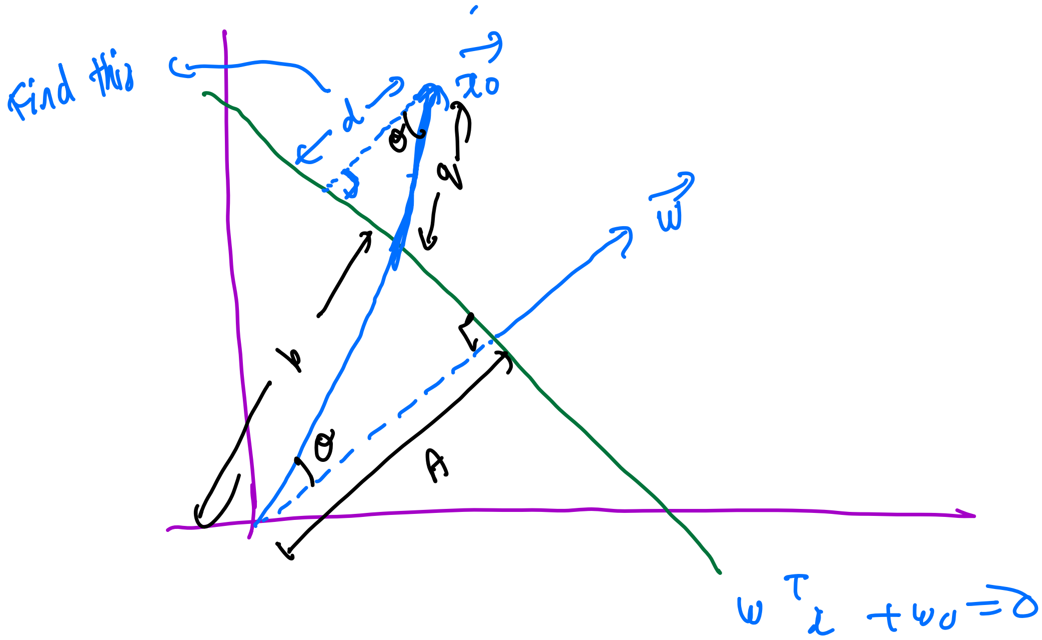
$$= \cancel{\|x_0\|} \cdot \left(\frac{w^T x_0}{\|w_0\| \cdot \cancel{\|x_0\|}} \right)$$

$$d = \left(\frac{w^T x_0}{\|w_0\|} \right)$$

$$d = \left(\frac{-w_0}{\|w_0\|} \right) \sim \frac{|w_0|}{\|\vec{w}\|}$$

Distance of a pt from h-plane

Oyeok'8 : 04



$$A = \frac{-w_0}{\|\vec{w}\|} \quad \text{— } 1$$

$$\cos\theta = \frac{A}{p}$$

$$p = \frac{A}{\cos\theta}$$

$$p + q = \|\vec{x_0}\| \Rightarrow \boxed{q = \|x_0\| - p = \|x_0\| - \frac{A}{\cos\theta}}$$

$$\cos\theta = \frac{d}{q}$$

$$d = q\cos\theta$$

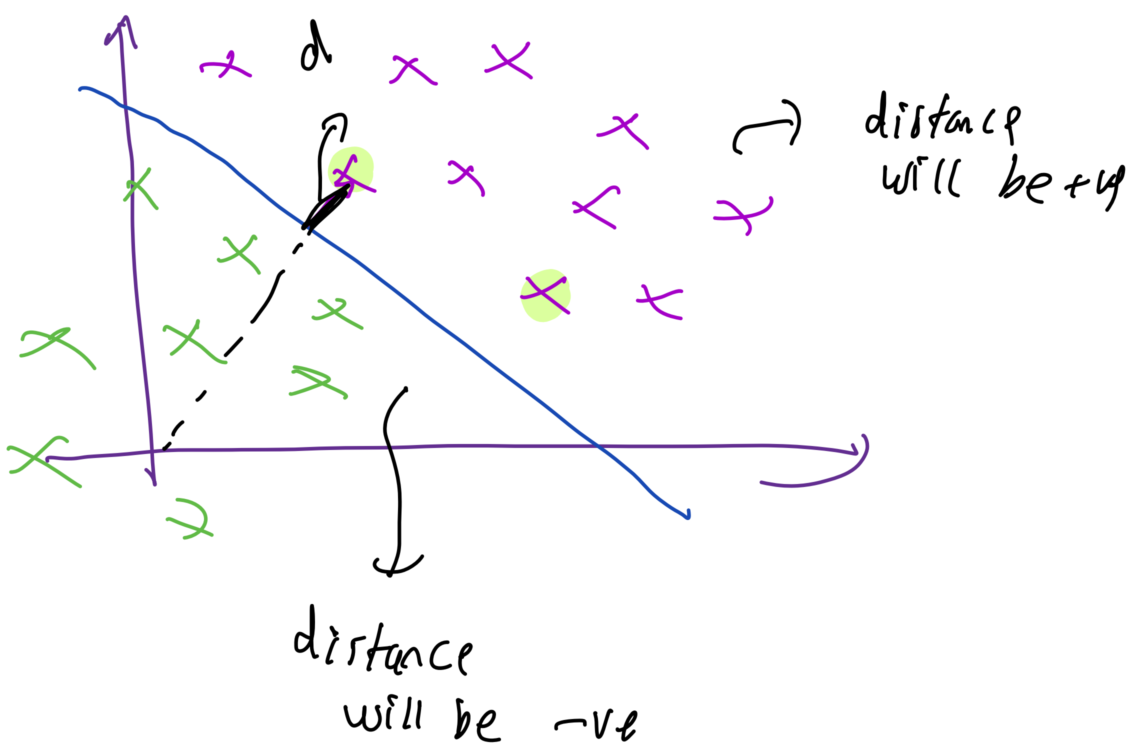
$$= \left(\|x_0\| - A \right) \cos\theta$$

$$\left(\qquad \overline{\cos\theta} \right)$$

$$= \left(\|x_0\| \cos\theta - A \right)$$

$$= \cancel{\|x_0\|} \frac{\vec{w} \cdot \vec{x}_0}{\cancel{\|\vec{x}\|} \cdot \|\vec{w}\|} - \left(\frac{-w_0}{\|\vec{w}\|} \right)$$

$$\boxed{d = \frac{|w^T x_0 + w_0|}{\|\vec{w}\|}}$$



Prob - stats ⇒ morning → ·

→ Prob ·