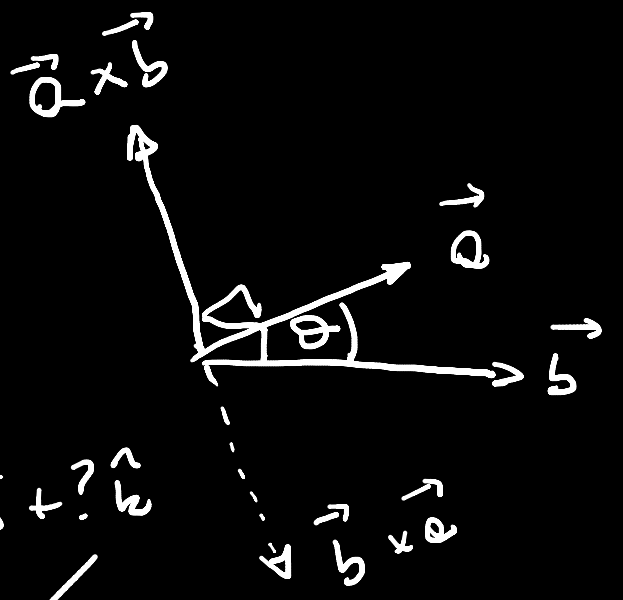
11/07/2025 Producto Cruz.

$\hat{i} = (1,0,0)$
$\hat{j} = (0,1,0)$
$\hat{k} = (0,0,1)$



$\vec{a} = (a_1, a_2, a_3)$

$\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$

$\vec{b} = (b_1, b_2, b_3)$

$\vec{b} = b_1\hat{i} + b_2\hat{j} + b_3\hat{k}$

$\vec{a} \times \vec{b} = ?\hat{i} + ?\hat{j} + ?\hat{k}$

¿Cómo lo calculamos?

$$\vec{a} \times \vec{b} = \det \begin{bmatrix} \hat{i} & \hat{j} & \hat{k} \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{bmatrix} =$$

$$= \hat{i}(a_2 b_3 - a_3 b_2) - \hat{j}(a_1 b_3 - a_3 b_1) + \hat{k}(a_1 b_2 - a_2 b_1)$$

Ejemplo $\vec{a} = (1, -2, 3)$; $\vec{b} = (2, 1, 4)$

$$\vec{a} \times \vec{b} = \det \begin{bmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -2 & 3 \\ 2 & 1 & 4 \end{bmatrix} = \hat{i}(-8 - 3) - \hat{j}(4 - 6) + \hat{k}(1 + 4)$$

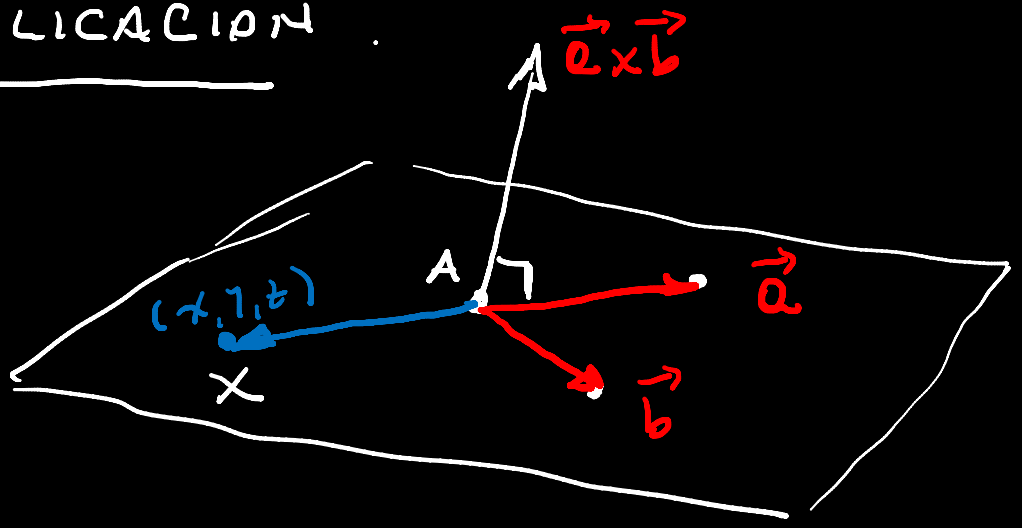
$$= -11\hat{i} + 2\hat{j} + 5\hat{k} \quad \checkmark$$

$\therefore \vec{a} \times \vec{b} = (-11, 2, 5)$ ✓

$(-11, 2, 5) \cdot (1, -2, 3) = 0$ ✓ ; $(-11, 2, 5) \cdot (2, 1, 4) = 0$ ✓

TAREA $\vec{b} \times \vec{a}$

APLICACIÓN



¡ el plano !

Ejemplo $A=(1,-1,2)$; $B=(0,1,3)$; $C=(1,1,-1)$

$\vec{a}=\overrightarrow{AB}=(-1,2,1)$; $\vec{b}=\overrightarrow{AC}=(0,2,-3)$

$\vec{a}\times\vec{b}=(-8,-3,-2)$; Tomamos el vector $\overrightarrow{AX}$

$\overrightarrow{AX}=(x-1,y+1,z-2)$

$\therefore\ (x-1,y+1,z-2)\cdot(-8,-3,-2)=0$

$-8(x-1)-3(y+1)-2(z-2)=0$

$-8x+8-3y-3-2z+4=0$

$-8x-3y-2z=-9$ /-1

$\boxed{8x+3y+2z=9}$