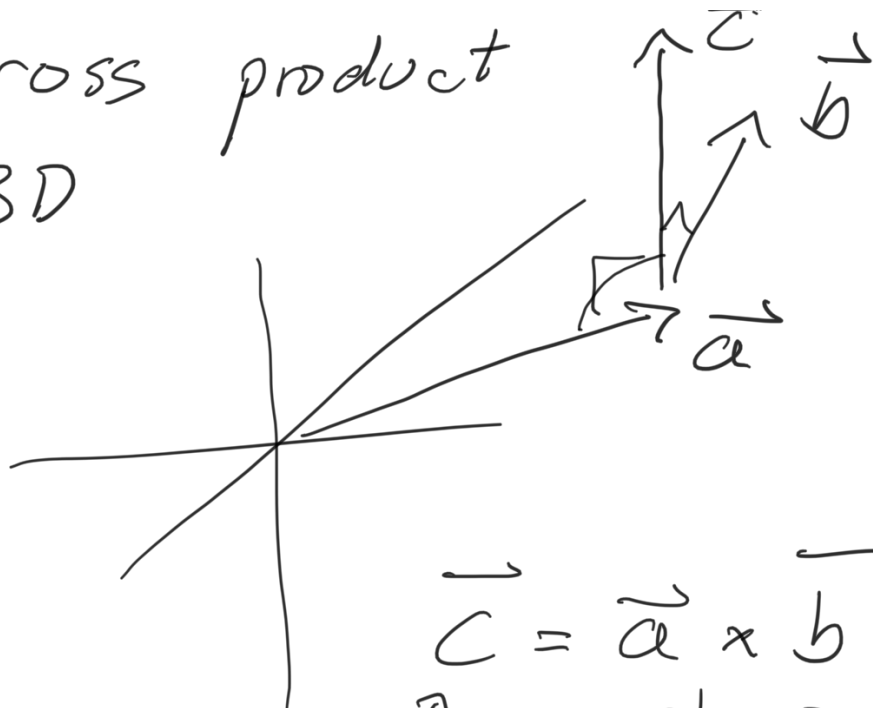


cross product  
3D

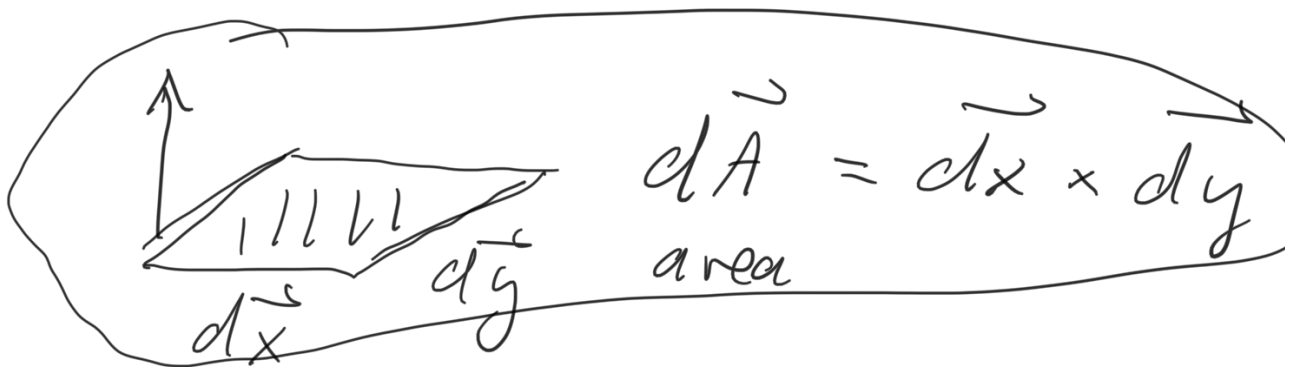


$$\vec{c} = \vec{a} \times \vec{b}$$

plane

$\perp$  to both

$$|\vec{c}| = |\vec{a}| |\vec{b}| \sin \theta$$



$$\vec{a} = a_x \hat{i} + a_y \hat{j} + a_z \hat{k}$$
$$\vec{b} = b_x \hat{i} + b_y \hat{j} + b_z \hat{k}$$

$$\vec{a} \cdot \vec{b} = a_x b_x + a_y b_y + a_z b_z$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix}$$

$\begin{matrix} + \\ x y z \\ y z x \\ z x y \\ \hline \text{even} \end{matrix}$ 
 $\begin{matrix} \text{odd} \\ x z y \\ z y x \\ y x z \\ \hline \text{odd} \end{matrix}$

$$= \hat{i} (a_y b_z - a_z b_y) + \hat{j} (a_z b_x - a_x b_z) + \hat{k} (a_x b_y - a_y b_x)$$

