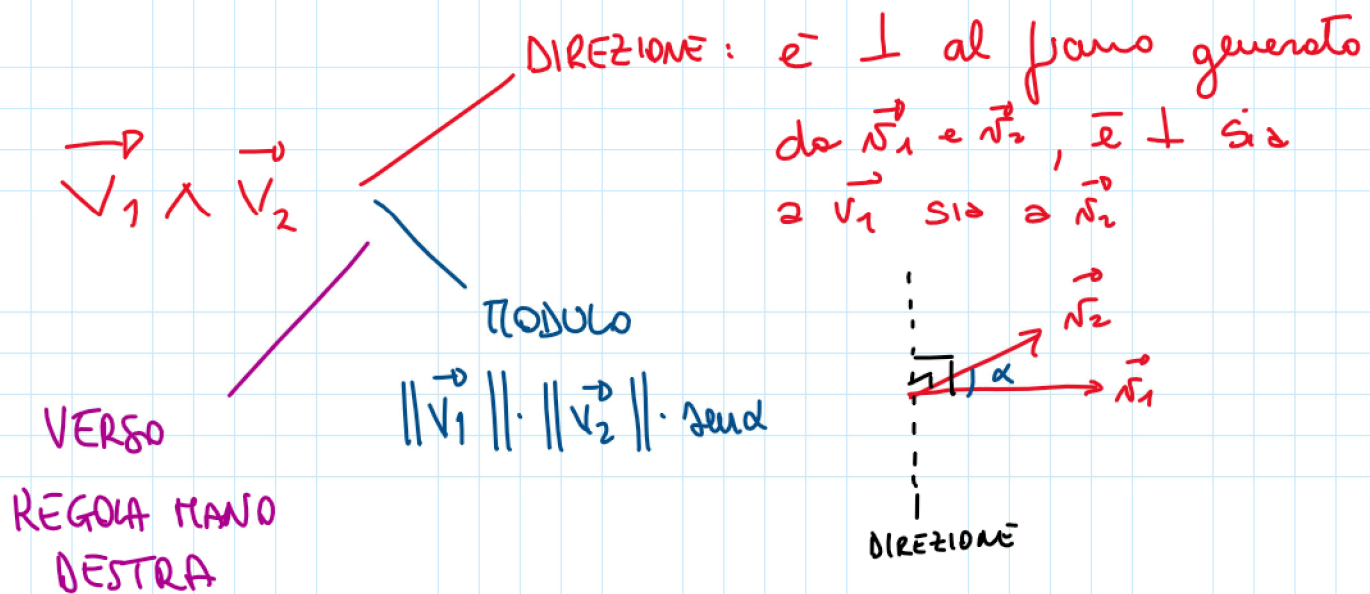
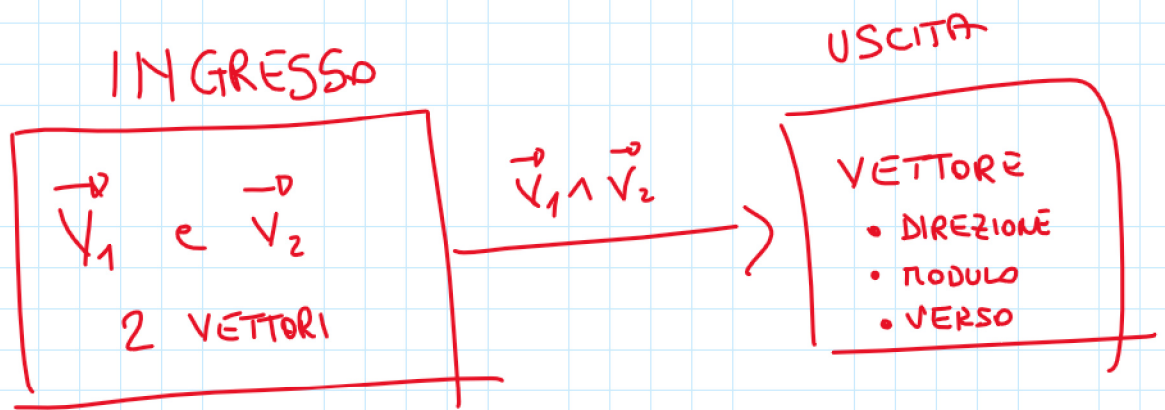




COME SI CALCOLA?

$$\vec{v}_1 (1, -2, 1)$$

$$\vec{v}_2 (-3, 1, 0)$$

$$\vec{v}_1 \wedge \vec{v}_2$$

$$\begin{pmatrix} \text{I} & \text{J} & \text{K} \\ 1 & -2 & 1 \\ -3 & 1 & 0 \end{pmatrix}$$

$$\text{I} \cdot \begin{vmatrix} -2 & 1 \\ 1 & 0 \end{vmatrix} - \text{J} \cdot \begin{vmatrix} 1 & 1 \\ -3 & 0 \end{vmatrix} + \text{K} \cdot \begin{vmatrix} 1 & -2 \\ -3 & 1 \end{vmatrix}$$

$$\begin{array}{c}
 \text{SOPPRIMO} \\ \text{RIGA E COLONNA}
 \end{array}
 \begin{array}{c}
 \text{SOPPRIMO} \\ \text{RIGA E COLONNA}
 \end{array}
 \begin{array}{c}
 \text{SOPPRIMO} \\ \text{RIGA E COLONNA}
 \end{array}$$

$a_{12} \quad 1+2=3 \text{ DISPARI}$

$$i(-1) - j(+3) + k(1-6)$$

$$-i - 3j - 5k$$

$$\vec{V}_1 \wedge \vec{V}_2 = (-1, -3, -5)$$

ESERCIZIO

$$\vec{V}_1 = (1, 0, -1) \quad \vec{V}_2 = (0, 1, 1)$$

1) TROVA $\|\vec{V}_1\|$ e $\|\vec{V}_2\|$

2) TROVA L'ANGOLO TRA $\vec{V}_1$ e $\vec{V}_2$

3) TROVA $\vec{V}_1 \cdot \vec{V}_2$

4) TROVA $\vec{V}_1 \wedge \vec{V}_2$

$$1) \|\vec{V}_1\| = \sqrt{(1)^2 + (0)^2 + (-1)^2} = \sqrt{2}$$

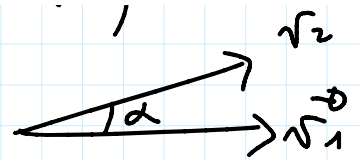
$$\text{VERSORE DI } \vec{V}_1 = \frac{1}{\sqrt{2}} (1, 0, -1)$$

$$\|\vec{V}_2\| = \sqrt{(0)^2 + (1)^2 + (1)^2} = \sqrt{2}$$

$$\text{VERSORE DI } \vec{V}_2 = \frac{1}{\sqrt{2}} (0, 1, 1)$$

$$\vec{V}_1 \cdot \vec{V}_2 = \dots \rightarrow \vec{V}_2$$

2) ANGOLO TRA $\vec{v}_1$ e $\vec{v}_2$



USO IL PRODOTTO SCALARE

$$\vec{v}_1 \cdot \vec{v}_2 = \|\vec{v}_1\| \cdot \|\vec{v}_2\| \cdot \cos \alpha$$

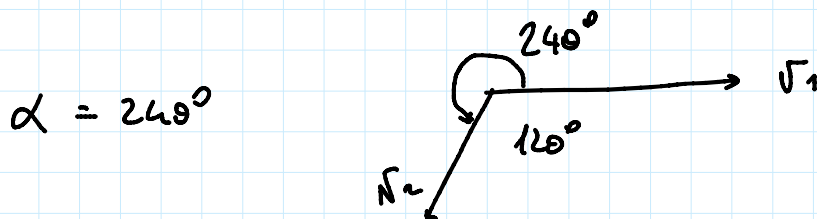
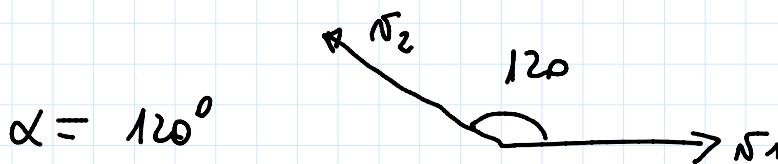
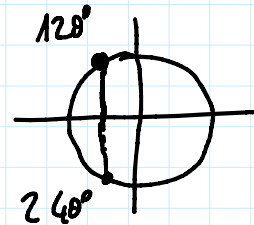
$$(1, 0, -1) \cdot (0, 1, 1) = \sqrt{2} \cdot \sqrt{2} \cdot \cos \alpha$$

$$0 + 0 - 1 = 2 \cos \alpha$$

$$\cos \alpha = -\frac{1}{2}$$

$$\alpha = 120^\circ$$

$$\alpha = 240^\circ$$



$$3) \vec{v}_1 \cdot \vec{v}_2 = -1$$

$$4) \vec{v}_1 \wedge \vec{v}_2$$

$$\begin{pmatrix} i & j & k \\ 1 & 0 & -1 \\ 0 & 1 & 1 \end{pmatrix}$$

$$2 \begin{vmatrix} 0 & -1 \\ 1 & 1 \end{vmatrix} - \begin{vmatrix} 1 & -1 \\ 0 & 1 \end{vmatrix} + K \begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$$

$$\vec{n} = \vec{j} + K$$

$$\vec{V}_1 \wedge \vec{V}_2 \quad (1, -1, 1)$$