(10) $\bar{a}(1,2,2)$ $\bar{b}=(-4,5,-3)$ $\bar{c}(-4,5,-3)$

$\bar{a}.\bar{b} = 1(-4)+2.5+2(-3)=0$

$|\bar{a}| = \sqrt{1^2+2^2+2^2}=3$

$|\bar{b}| = \sqrt{16+25+9} = \sqrt{50}=5\sqrt{2}$

α $\bar{a},\bar{b}$ $\cos(\bar{a}.\bar{b}) = \frac{0}{\sqrt{\ }\sqrt{\ }}=0 \Rightarrow \hat{\bar{a},\bar{b}} = 90^\circ$

Proy $\bar{b}$ sobre $\bar{a}$

$|\bar{b}'| = \frac{|\bar{a}.\bar{b}|}{|\bar{a}|}=0$

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(11) $\bar{a}=\bar{i}+m\bar{j}+\bar{k}=(1,m,1)$

$\bar{b}=-2\bar{i}+4\bar{j}+m\bar{k}=(-2,4,m)$

a) $\parallel$ $\frac{1}{-2}=\frac{m}{4}=\frac{1}{m}$

$4=m2m$ $m^2=4$ $m=2$

$m=-2$ $m=\pm -2$

b) $\perp$ $\bar{a}.\bar{b}=0$

$-2+4m+m=0$ $m=\frac{2}{5}$

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(12) $\bar{u}(3,1,2)$ $\bar{v}(1,-1,2)$

$|\bar{u}'| = \frac{|\bar{u}.\bar{v}|}{|\bar{v}|} = \frac{|3-1+4|}{\sqrt{1+1+4}} = \frac{6}{\sqrt{6}} = \sqrt{6}$

$\bar{u}' = \frac{|\bar{u}.\bar{v}|}{|\bar{v}|^2}\bar{v} = \frac{6}{(\sqrt{6})^2}\bar{v} = 1.\bar{v} = (1,-1,2)$

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(13) $\bar{a}=(1,2,3)$ $\bar{b}=(2,-2,1)$

$\bar{a} \perp \bar{b}$? $\bar{a}\bar{b}=0$

$2-4+3=0$ NO

$\cos(\bar{a},\bar{b}) = \frac{1}{\sqrt{1+4+9}\sqrt{4+4+1}}$

$= \frac{1}{3\sqrt{15}}$

$\hat{\bar{a},\bar{b}} = \arccos\frac{1}{3\sqrt{14}} = 85^\circ 53' 20''$

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(14) $\bar{u} = \left(\frac{1}{2}, \frac{1}{2}, 0\right)$

$|\bar{u}| = \sqrt{\frac{1}{4}+\frac{1}{4}} = \sqrt{\frac{1}{2}} = \frac{\sqrt{2}}{2} \neq 1$

NO UNITARIO

$\bar{u}' = \left(\frac{1/2}{\sqrt{2}/2}, \frac{1/2}{\sqrt{2}/2}, \frac{0}{\sqrt{2}/2}\right)$

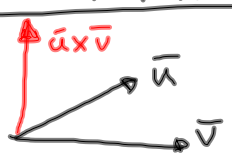
$\pm\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0\right) = \pm\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0\right)$

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PRODUCTO VECTORIAL (Vector)

Vect.

- $|\bar{u} \times \bar{v}| = |\bar{u} \wedge \bar{v}| = |\bar{u}|\,|\bar{v}|\,\text{sen}(\hat{\bar{u},\bar{v}})$
- Dirección



- Sentido $(\hat{\bar{u},\bar{v}}) < 180° \Rightarrow$ Arriba
  $(\hat{\bar{u},\bar{v}}) > 180° \Rightarrow$ Abajo

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$\bar{u} \times \bar{v} = \bar{0} \begin{cases} \bar{u} = \bar{0} \text{ ó } \bar{v} = \bar{0} \\ \text{sen}(\hat{\bar{u},\bar{v}}) = 0 \quad 0° \end{cases}$

Paralelos $\Rightarrow \bar{u} \times \bar{v} = \bar{0}$

Propiedades

$\bar{u} \times \bar{v} = -\bar{v} \times \bar{u}$



$\bar{i} \times \bar{j} = \bar{k} \quad \bar{j} \times \bar{k} = \bar{i} \quad \bar{k} \times \bar{i} = \bar{j}$



$\bar{i}, \bar{j}, \bar{k}, \bar{i}, \bar{j}, \bar{k}$

$\bar{k} \wedge \bar{j} = -\bar{i}$

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Exp. analítica

$\bar{u} \times \bar{v} = \begin{vmatrix} \bar{i} & \bar{j} & \bar{k} \\ u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \end{vmatrix} = (\ ,\ ,\ )$

$\bar{u} = (2, 1, 3)$

$\bar{v} = (0, -1, 2)$

$\bar{u} \times \bar{v} = \begin{vmatrix} \bar{i} & \bar{j} & \bar{k} \\ 2 & 1 & 3 \\ 0 & -1 & 2 \end{vmatrix} = 2\bar{i} - 2\bar{k} + 3\bar{i} + 4\bar{j}$

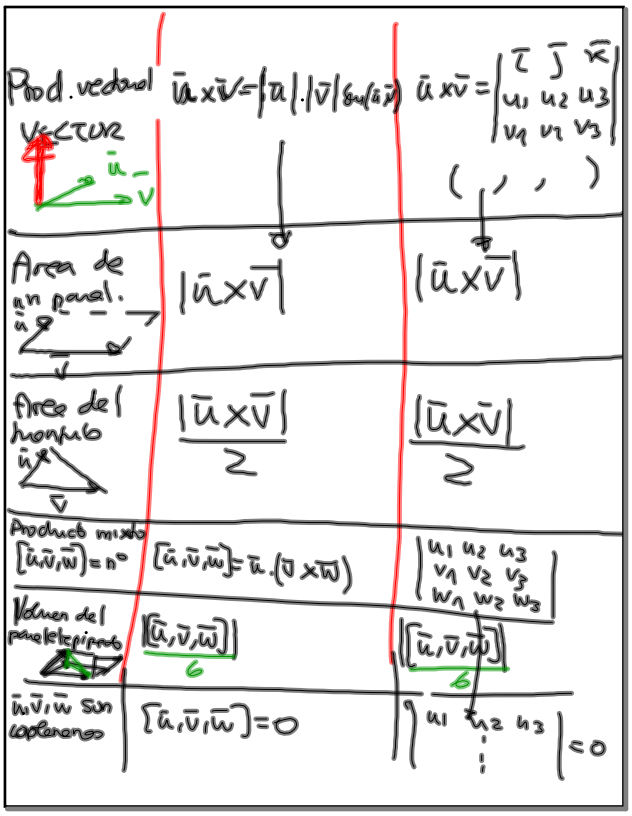
$5\bar{i} - 4\bar{j} - 2\bar{k}$

$\bar{i}\begin{vmatrix} 1 & 3 \\ -1 & 2 \end{vmatrix} - \bar{j}\begin{vmatrix} 2 & 3 \\ 0 & 2 \end{vmatrix} + \bar{k}\begin{vmatrix} 2 & 1 \\ 0 & -1 \end{vmatrix}$

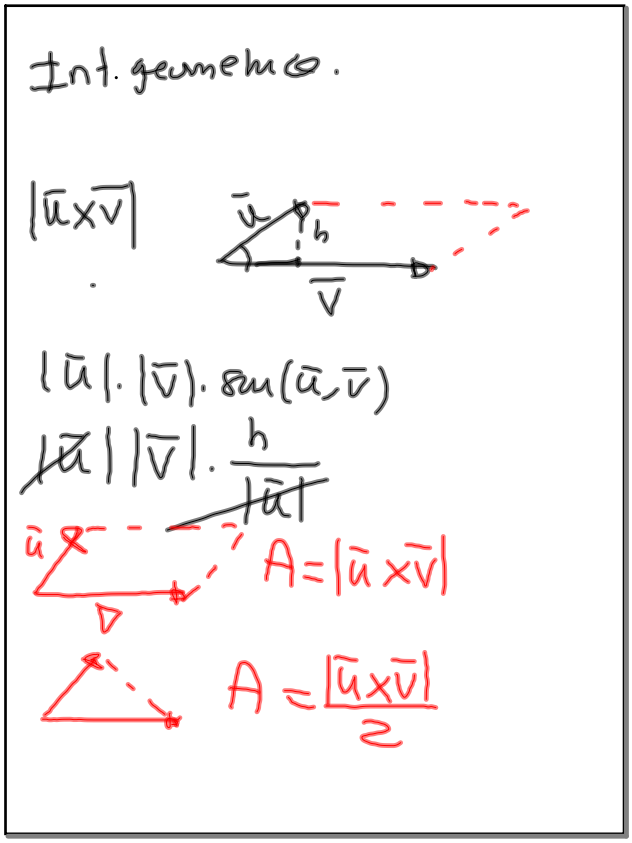
$(5, -4, -2)$

$(5, -4, -2)$

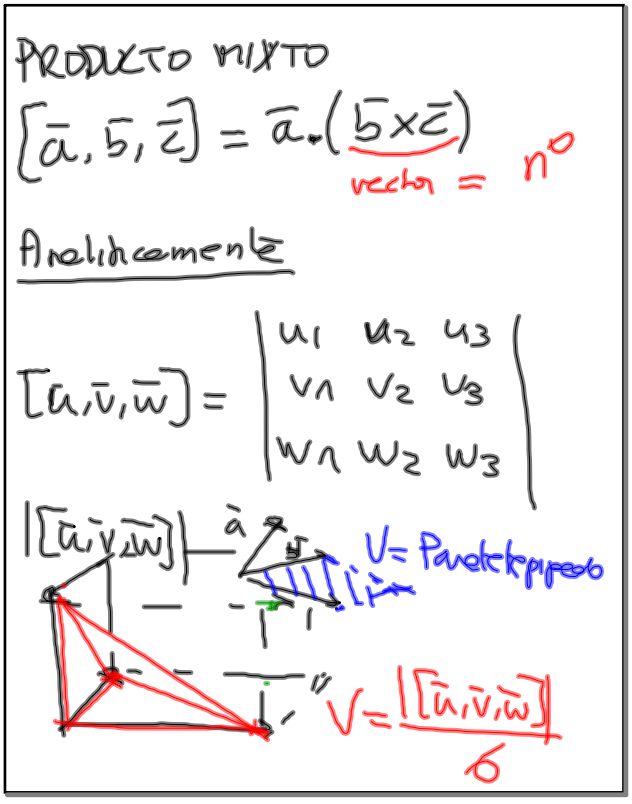
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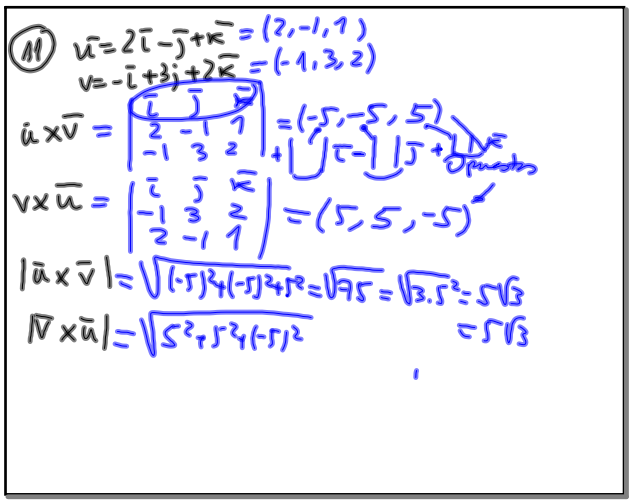
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