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#121260

MATH 1360 - 80
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1. Clasificar si los siguientes pares de vectores son paralelos, perpendiculares o ninguno de los dos.

a. $\vec{A} = i + 2j - k$ $\vec{B} = 2i + 2j + 6k$

b. $\vec{C} = i + 2j - k$ $\vec{D} = 3i + 6j - 3k$

c. $\vec{E} = i + 2j - k$ $\vec{F} = 2i + 3j - k$

2. Dados los vectores $\vec{A} = i + 2j + 3k$ y $\vec{B} = 2i + j - 5k$
Determina:

a. $C_{\vec{B}}\vec{A}$

b. $Proj_{\vec{B}}\vec{A}$

c. La componente vectorial del vector \vec{A} perpendicular al vector \vec{B}

1) a. $\vec{A} = i + 2j - k$
 $\vec{B} = 2i + 2j + 6k$

Perpendicular

$$\vec{A} \cdot \vec{B} = (\hat{i} + 2\hat{j} - \hat{k}) \cdot (2\hat{i} + 2\hat{j} + 6\hat{k})$$
$$= 2 + 4 - 6$$

$$= 0$$

$$\theta = \cos^{-1}\left(\frac{\vec{A} \cdot \vec{B}}{|\vec{A}||\vec{B}|}\right)$$

$$\theta = \cos^{-1}\left(\frac{0}{|\vec{A}||\vec{B}|}\right)$$

$$= \cos^{-1}(0)$$

$$= 90^\circ$$

b. $\vec{C} = i + 2j - k$
 $\vec{D} = 3i + 6j - 3k$

$$\vec{C} \cdot \vec{D} = (\hat{i} + 2\hat{j} - \hat{k}) \cdot (3\hat{i} + 6\hat{j} - 3\hat{k})$$

$$= 3 + 12 + 3$$

$$= 18$$

Paralelos

$$\theta = \cos^{-1}\left(\frac{\vec{C} \cdot \vec{D}}{|\vec{C}||\vec{D}|}\right)$$

$$= \cos^{-1}\left(\frac{18}{\sqrt{1^2 + 2^2 + (-1)^2} \sqrt{3^2 + 6^2 + (-3)^2}}\right)$$

$$= \cos^{-1}\left(\frac{18}{18}\right)$$

$$= \cos^{-1}(1)$$

$$\theta = 0^\circ$$

c. $\vec{E} = i + 2j - k$ Perpendicular
 $\vec{F} = 2i + 3j - k$

$$\theta = \cos^{-1} \left(\frac{\vec{E} \cdot \vec{F}}{|\vec{E}| |\vec{F}|} \right)$$

$$= \cos^{-1} \left(\frac{9}{\sqrt{1^2 + 2^2 + (-1)^2} \sqrt{2^2 + 3^2 + (-1)^2}} \right)$$

$$= \cos^{-1} \left(\frac{9}{2\sqrt{21}} \right)$$

$$\vec{E} \cdot \vec{F} = (i + 2j - k) \cdot (2i + 3j - k)$$

$$= 2 + 6 + 1$$

$$= 9$$

$$\theta = 10.89^\circ$$

2)

a. $C_B A$

$$B \cdot A = (2 \times 1) + (1 \times 2) + (-5 \times 3) = 2 + 2 - 15 = \boxed{-11}$$

b. $\text{Proj}_B A$

$$B \cdot B = (2 \times 2) + (1 \times 1) + (-5 \times -5) = 4 + 1 + 25 = \boxed{30}$$

$$= \frac{-11}{30} B = \frac{-11}{30} (2\hat{i} + \hat{j} - 5\hat{k}) = \left(\frac{-22}{30}, \frac{-11}{30}, \frac{55}{30} \right)$$

$$\text{Proj}_B A = \left(-\frac{11}{15}, -\frac{11}{30}, \frac{11}{6} \right)$$

c.

$$A - \text{Proj}_B A = \left(1 - \left(-\frac{11}{15} \right), 2 - \left(-\frac{11}{30} \right), 3 - \frac{11}{6} \right)$$

$$= \left(\frac{26}{15}, \frac{71}{30}, \frac{7}{6} \right)$$