

Dado:

$$\forall x = (x_1, x_2, \dots, x_n), y = (y_1, y_2, \dots, y_n) \in E(\mathbb{R}^n)$$

$$(x, y) = \sum_{i=1}^n x_i y_i$$

$$\|x\| = \sqrt{(x, x)} = \left(\sum_{i=1}^n x_i^2 \right)^{\frac{1}{2}}$$

$$\cos x^{\wedge} y = \frac{(x, y)}{\|x\| \|y\|} \quad | \quad x \neq 0, y \neq 0$$

$$x = (4, 2, 4), y = (12, 3, 4)$$

Calcular:

$$\|x\|, \|y\|, \cos x^{\wedge} y$$

Resolução:

$$x = (4, 2, 4) = (x_1, x_2, x_3) \in E(\mathbb{R}^3)$$

$$y = (12, 3, 4) = (y_1, y_2, y_3) \in E(\mathbb{R}^3)$$

$$(x, y) = \sum_{i=1}^3 x_i y_i = x_1 y_1 + x_2 y_2 + x_3 y_3 =$$

$$= 4 \cdot 12 + 2 \cdot 3 + 4 \cdot 4 = 48 + 6 + 16 = 70$$

$$\|x\| = \left(\sum_{i=1}^3 x_i^2 \right)^{\frac{1}{2}} = (x_1^2 + x_2^2 + x_3^2)^{\frac{1}{2}} =$$

$$= (4^2 + 2^2 + 4^2)^{\frac{1}{2}} = (16 + 4 + 16)^{\frac{1}{2}} = \sqrt{36} = 6$$

$$\|y\| = \left(\sum_{i=1}^3 y_i^2 \right)^{\frac{1}{2}} = (y_1^2 + y_2^2 + y_3^2)^{\frac{1}{2}} =$$

$$= (12^2 + 3^2 + 4^2)^{\frac{1}{2}} = (144 + 9 + 16)^{\frac{1}{2}} = \sqrt{169} = 13$$

$$\cos x^{\wedge} y = \frac{(x, y)}{\|x\| \|y\|} =$$

$$= \frac{70}{6 \cdot 13} = \frac{35}{39} \Rightarrow$$

$$\Rightarrow x^{\wedge} y = \arccos \frac{35}{39}$$

Ombem:

$$\boxed{\begin{array}{l} \|x\| = 6 \\ \|y\| = 13 \\ x^{\wedge} y = \arccos \frac{35}{39} \end{array}}$$