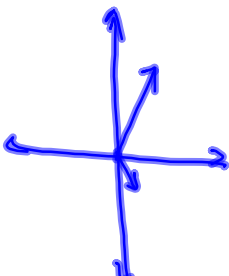


Applications of Dot product.

1) Let $\vec{A} = \langle 2, 6 \rangle$ & $\vec{B} = \langle 1, -2 \rangle$

a) what is $\vec{A} \cdot \vec{B}$? $\langle 2, 6 \rangle \cdot \langle 1, -2 \rangle$
 $= 2 + (-12) = -10$

b) what is the measure of $\angle$ b/w $\vec{A}$ & $\vec{B}$?



$$A \cdot B = |A| |B| \cos \theta$$

$$\cos \theta = \frac{A \cdot B}{|A| |B|} = \frac{-10}{\sqrt{40} \sqrt{5}} \quad \theta = 135^\circ$$

B/c $A \cdot B = |A| |B| \cos \theta$, when $A \perp B$, $A \cdot B = 0$

c) Let $A \perp C$, where $C = \langle 5, k \rangle$

Find K. $2 \cdot 5 + 6 \cdot k = 0$

$$10 = -6K$$

$$K = -\frac{10}{6}$$

d) Find Proj_a b

$$\text{proj}_{\vec{b}} \vec{a} = \frac{\vec{a} \cdot \vec{b}}{|\vec{b}|} \cdot \frac{\vec{b}}{|\vec{b}|}$$

$$= \frac{-10}{\sqrt{5}} \cdot \frac{\langle 1, -2 \rangle}{\sqrt{5}}$$

$$= \langle -2, 4 \rangle$$

$$2) \quad A = \langle 1, 0, 6 \rangle$$

$$B = \langle -2, 1, 3 \rangle$$

$$C = \langle 5, 1, k \rangle$$

$$a) \quad A \cdot B = -2 + 0 + 18 = 16$$

$$b) \quad \text{max b/w } A \text{ \& } B.$$

$$\cos \theta = \frac{A \cdot B}{|A||B|} = \frac{16}{\sqrt{37}\sqrt{14}}$$

$$\cos^{-1}(\text{ans}) = 45.3^\circ$$

$$c) \quad K \text{ if } A \perp C \quad \vec{A} \cdot \vec{C} = 0 = 5 + 0 + 6k$$

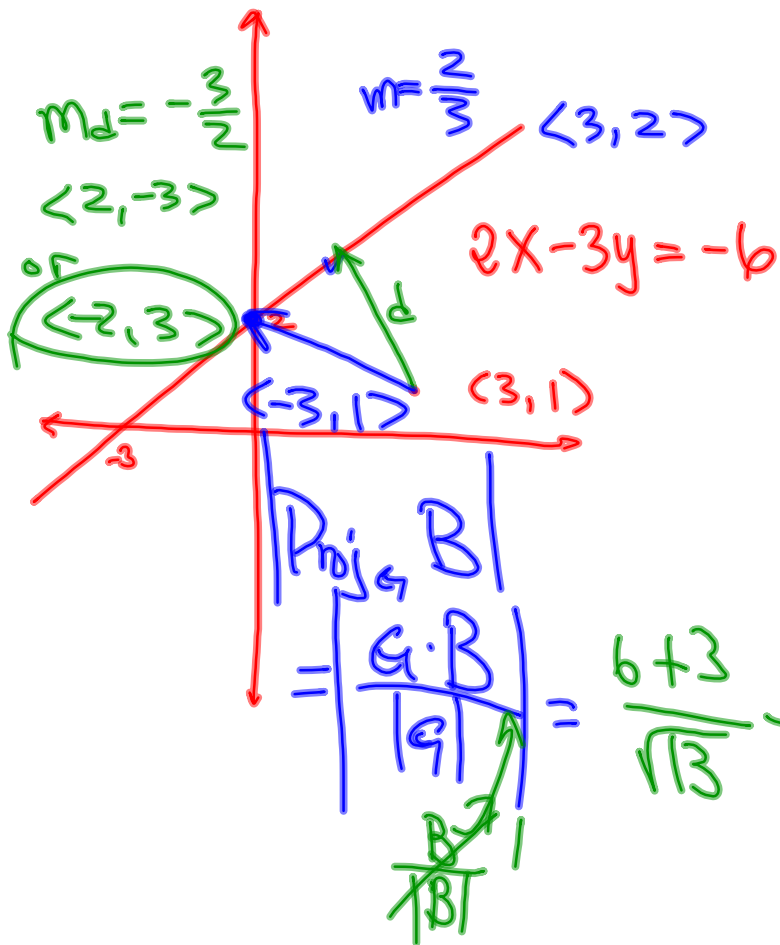
$$d) \quad \text{Proj}_A B$$

$$\therefore 6k = -5 \quad K = \frac{-5}{6}$$

$$= \frac{\vec{A} \cdot \vec{B}}{|\vec{A}|} \cdot \frac{\vec{A}}{|\vec{A}|} = \frac{16}{\sqrt{37}} \cdot \frac{\langle 1, 0, 6 \rangle}{\sqrt{37}}$$

$$\left\langle \frac{16}{37}, 0, \frac{96}{37} \right\rangle$$

Find d .



(x_1, y_1)

$$Ax + By + C = 0$$

$$d = \frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}}$$

$$\frac{9}{\sqrt{13}}$$