(1 point) In general, what can be said about the vector product $x \times (x \times y)$?

- A. the result is orthogonal to x (selected)
- B. the result is orthogonal to y
- C. the result is orthogonal to x and y
- D. the result is parallel to x
- E. the result is parallel to y
- F. the result is not parallel to x or to y

(1 point) Find the vector in $\mathbb{R}^3$ from point $A = (x, y, z)$ to $B = (6, -4, 3)$.

$\overrightarrow{AB} =$ <6-x,-4-y,3-z> help (vectors)

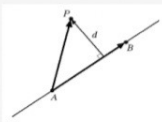
(1 point) From the list below, select the vector that is NOT orthogonal (perpendicular) to:

$$\begin{bmatrix} \cos\theta \\ \sin\theta \\ 1 \end{bmatrix}$$

- A. $\begin{bmatrix} -\sin\theta \\ \cos\theta \\ 0 \end{bmatrix}$ (selected)
- B. $\begin{bmatrix} -\cos\theta \\ -\sin\theta \\ 1 \end{bmatrix}$
- C. $\begin{bmatrix} \sin\theta \\ -\cos\theta \\ 0 \end{bmatrix}$
- D. $\begin{bmatrix} 0 \\ -1 \\ \sin\theta \end{bmatrix}$
- E. $\begin{bmatrix} \sin\theta \\ \cos\theta \\ 0 \end{bmatrix}$

(1 point)

The distance d of a point P to the line through points A and B is the length of the component of $\overline{AP}$ that is orthogonal to $\overline{AB}$, as indicated in the diagram.



So the distance from $P = (4, -3)$ to the line through the points $A = (-4, 1)$ and $B = (0, 4)$ is sqrt(24*24+32*32)/5 .

(1 point) If $\vec{v} \times \vec{w} = 2\vec{i} + 2\vec{j} + \vec{k}$, and $\vec{v} \cdot \vec{w} = 3$, and θ is the angle between $\vec{v}$ and $\vec{w}$, then

(a) $\tan\theta =$ 1

(b) $\theta =$ tan^(-1)(1)

(1 point) Let $\mathbf{a} = (6, -7, -3)$ and $\mathbf{b} = (-2, -9, 4)$ be vectors.

(A) Find the scalar projection of $\mathbf{b}$ onto $\mathbf{a}$.

Scalar Projection: 39/sqrt(94)

(B) Decompose the vector $\mathbf{b}$ into a component parallel to $\mathbf{a}$ and a component orthogonal to $\mathbf{a}$.

Parallel component: (39*6/94 , 39*(-7)/94 , 39*(-3)/94)

Orthogonal Component: (-2-39*6/94 , -9-39*(-7)/94 , 4-39*(-3)/(94))

(1 point) Find two vectors $\overline{v}_1$ and $\overline{v}_2$ whose sum is $\langle -3, 2, -5 \rangle$, where $\overline{v}_1$ is parallel to $\langle 4, 4, -2 \rangle$ while $\overline{v}_2$ is perpendicular to $\langle 4, 4, -2 \rangle$.

$\overline{v}_1 =$ <2/3,2/3,-1/3> and

$\overline{v}_2 =$ <-11/3,4/3,-14/3> .

(1 point) Are the following statements true or false?

False **1.** If $\vec{v}$ and $\vec{w}$ are any two vectors, then $||\vec{v} + \vec{w}|| = ||\vec{v}|| + ||\vec{w}||$.

True **2.** $(\vec{i} \times \vec{j}) \cdot \vec{k} = \vec{i} \cdot (\vec{j} \times \vec{k})$.

False **3.** For any scalar c and any vector $\vec{v}$, we have $||c\vec{v}|| = c||\vec{v}||$.

True **4.** The value of $\vec{v} \cdot (\vec{v} \times \vec{w})$ is always zero.