

Due: Thu Apr 9 2015 11:00 PM PDT

Question

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1. Question Details

SCalcET7 12.4.002. [1785454]

Find the cross product  $\mathbf{a} \times \mathbf{b}$ .

$$\mathbf{a} = \langle 1, 1, -1 \rangle, \quad \mathbf{b} = \langle 3, 8, 10 \rangle$$

Verify that it is orthogonal to both  $\mathbf{a}$  and  $\mathbf{b}$ .

$$(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{a} = \boxed{\phantom{000}}$$

$$(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{b} = \boxed{\phantom{000}}$$

2. Question Details

SCalcET7 12.4.004. [1864785]

Find the cross product  $\mathbf{a} \times \mathbf{b}$ .

$$\mathbf{a} = \mathbf{j} + 9\mathbf{k}, \quad \mathbf{b} = 4\mathbf{i} - \mathbf{j} + 3\mathbf{k}$$

Verify that it is orthogonal to both  $\mathbf{a}$  and  $\mathbf{b}$ .

$$(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{a} = \boxed{\phantom{000}}$$

$$(\mathbf{a} \times \mathbf{b}) \cdot \mathbf{b} = \boxed{\phantom{000}}$$

3. Question Details

SCalcET7 12.4.008. [1785415]

If  $\mathbf{a} = \mathbf{i} - 4\mathbf{k}$  and  $\mathbf{b} = \mathbf{j} + \mathbf{k}$ , find  $\mathbf{a} \times \mathbf{b}$ .

## 4. Question Details

State whether each expression is meaningful. If not, explain why. If so, state whether it is a vector or a scalar.

(a)  $\mathbf{a} \cdot (\mathbf{b} \times \mathbf{c})$

- The expression is meaningful. It is a vector.
- The expression is meaningful. It is a scalar.
- The expression is meaningless. The cross product is defined only for two vectors.
- The expression is meaningless. The dot product is defined only for two vectors.

(b)  $\mathbf{a} \times (\mathbf{b} \cdot \mathbf{c})$

- The expression is meaningful. It is a vector.
- The expression is meaningful. It is a scalar.
- The expression is meaningless. The cross product is defined only for two vectors.
- The expression is meaningless. The dot product is defined only for two vectors.

(c)  $\mathbf{a} \times (\mathbf{b} \times \mathbf{c})$

- The expression is meaningful. It is a vector.
- The expression is meaningful. It is a scalar.
- The expression is meaningless. The cross product is defined only for two vectors.
- The expression is meaningless. The dot product is defined only for two vectors.

(d)  $\mathbf{a} \cdot (\mathbf{b} \cdot \mathbf{c})$

- The expression is meaningful. It is a vector.
- The expression is meaningful. It is a scalar.
- The expression is meaningless. The cross product is defined only for two vectors.
- The expression is meaningless. The dot product is defined only for two vectors.

(e)  $(\mathbf{a} \cdot \mathbf{b}) \times (\mathbf{c} \cdot \mathbf{d})$

- The expression is meaningful. It is a vector.
- The expression is meaningful. It is a scalar.
- The expression is meaningless. The cross product is defined only for two vectors.
- The expression is meaningless. The dot product is defined only for two vectors.

(f)  $(\mathbf{a} \times \mathbf{b}) \cdot (\mathbf{c} \times \mathbf{d})$

- The expression is meaningful. It is a vector.
- The expression is meaningful. It is a scalar.
- The expression is meaningless. The cross product is defined only for two vectors.
- The expression is meaningless. The dot product is defined only for two vectors.