

13.3: The Dot Product

Calculus III

College of the Atlantic

Consider the following vectors:

- $\vec{a} = 3\vec{i} - 2\vec{j}$
- $\vec{b} = -2\vec{i} - 2\vec{j}$
- $\vec{c} = \vec{i} + 3\vec{j}$
- $\vec{v} = 3\vec{i} - 2\vec{j} + \vec{k}$

1. Find a vector perpendicular to \vec{a} .
2. Find another vector perpendicular to \vec{a} .
3. Find vector parallel to \vec{b} .
4. Find another vector parallel to \vec{b} .
5. Find a unit vector parallel to \vec{b} .
6. Calculate $\vec{a} \cdot \vec{b}$.
7. What is the angle between \vec{a} and \vec{b} ?
8. What is $\vec{c} \cdot \vec{i}$?
9. What is $\vec{c} \cdot \vec{j}$?
10. In words, what does $\vec{c} \cdot \vec{j}$ mean?
11. Find the equation of a plane that is perpendicular to \vec{v} and which goes through the point $(1, 2, 3)$.
12. Find a vector normal to the plane $z = 0.5x + 1.2y$.

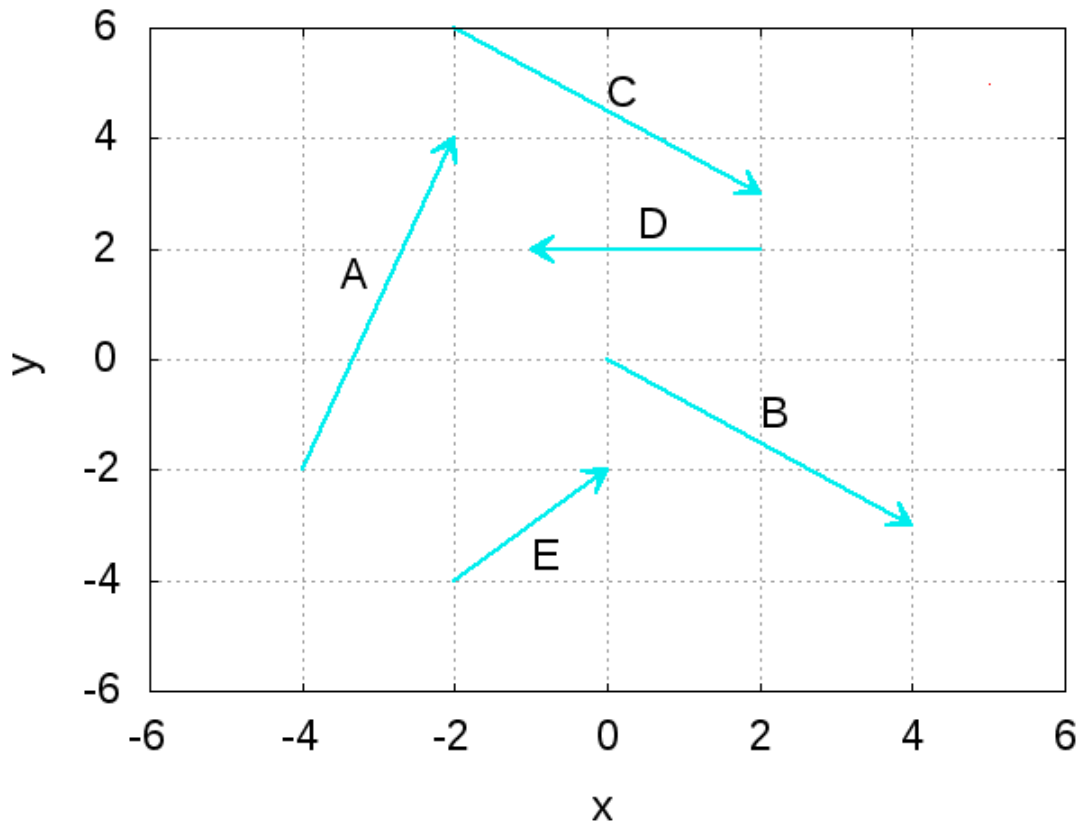


Figure 1: Some Vectors.

A bunch of vectors are shown in Fig. 1. Without doing a calculation determine if the following quantities are positive, negative, or zero:

1. $\vec{E} \cdot \vec{B}$
2. $\vec{B} \cdot \vec{E}$
3. $\vec{D} \cdot \vec{D}$
4. $\vec{A} \cdot \vec{C}$