13.3: The Dot Product

Calculus III

College of the Atlantic. Winter 2016

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 $(1, 2, 3)$.
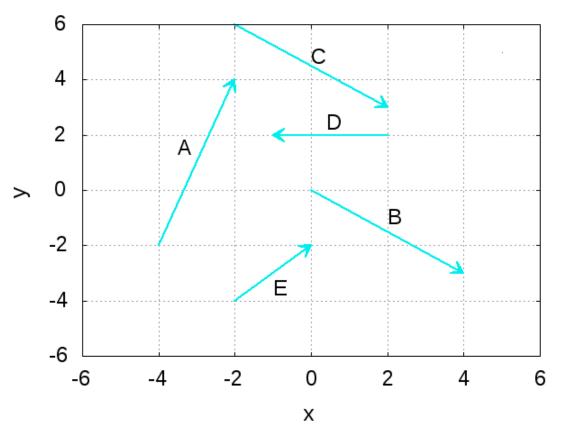
Figure 1: Some Vectors.

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. $\vec{A} \cdot \vec{C}$