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. Calculate $\vec{a} \cdot \vec{b}$.
2. What is the angle between $\vec{a}$ and $\vec{b}$?
3. What is $\vec{c} \cdot \vec{i}$?
4. What is $\vec{c} \cdot \vec{j}$?
5. In words, what does $\vec{c} \cdot \vec{j}$ mean?

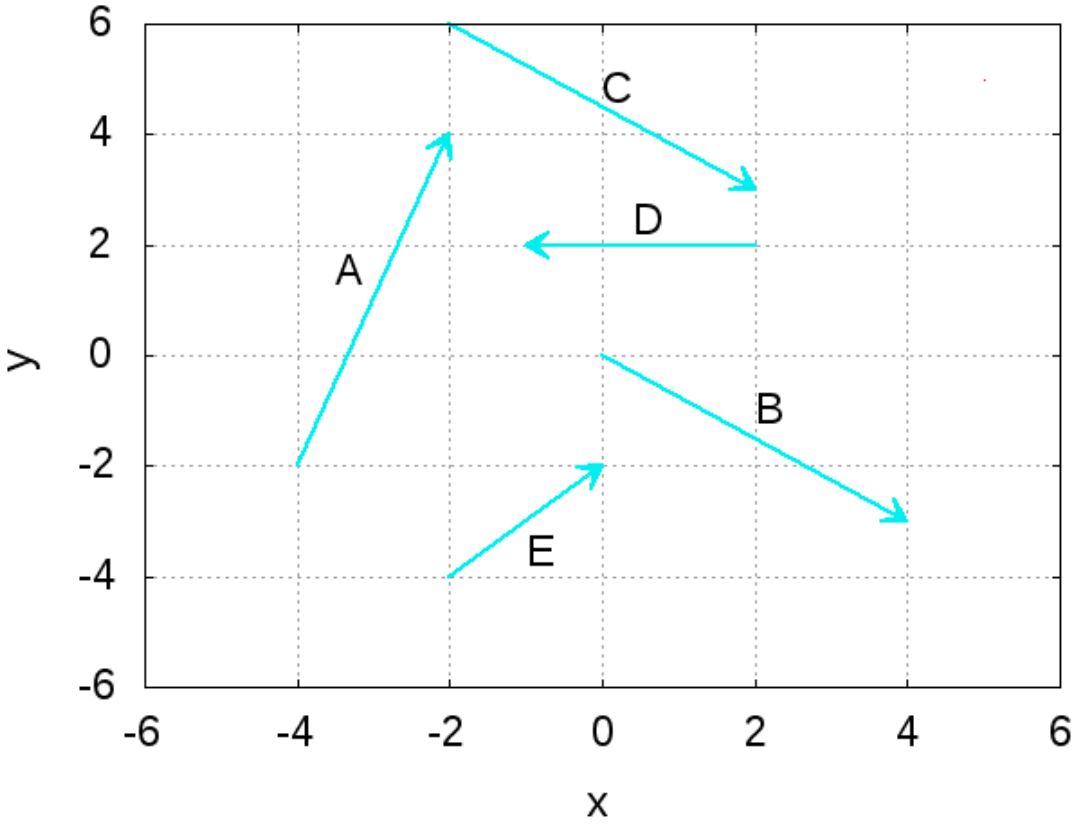

Figure 1: Some Vectors.

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