

# 13.1 and 13.2: Vectors

## Calculus III

College of the Atlantic. Winter 2016

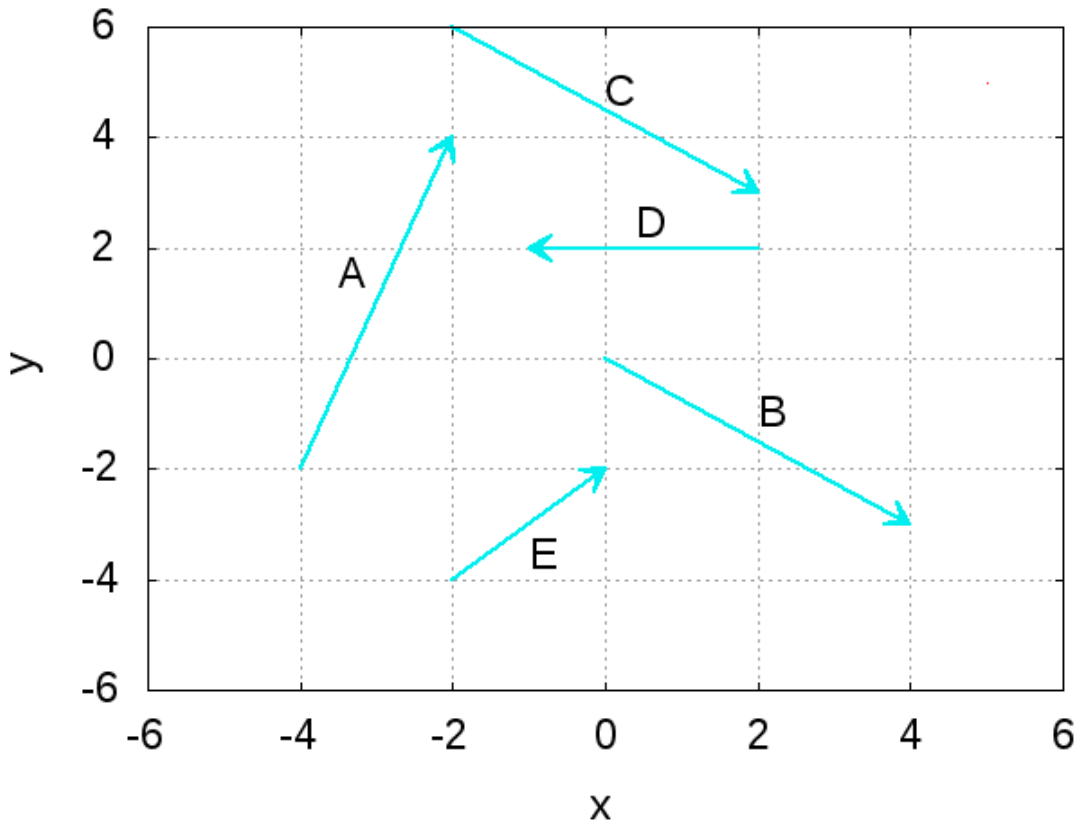


Figure 1: Some Vectors.

- On the grid above are several vectors. For each vector:
  - Write down the vector in component form.
  - Are any of the vectors identical?
  - Find a unit vector pointing in the same direction as the vector.
- Calculate the following and illustrate the geometric meaning of the operation with a sketch:
  - $\vec{A} + \vec{B}$
  - $\vec{A} - \vec{C}$
  - $2\vec{B}$
  - $\vec{A} - \vec{E}$

3. Consider the three vectors defined by the displacement from point  $P$  to  $Q$ :

- $\vec{v}_1$  = displacement from  $P = (8, 5)$  to  $Q = (1, -2)$ .
- $\vec{v}_2$  = displacement from  $P = (6, 3)$  to  $Q = (-1, -4)$ .
- $\vec{v}_3$  = displacement from  $P = (7, -3)$  to  $Q = (0, -10)$ .

(a) Write each vector in component form.

(b) For each vector, find a unit vector pointing in the same direction as the vector.

4. A pilot flying in a wind blowing 80 mph due south discovers that she is heading due east when she points her plane in the direction 60 degrees east of due north. Determine the airspeed of the plane.

5. What heading and airspeed are required for a plane to fly 837 mph due north if a wind of 31.5 mph is blowing in the direction 11.5 degrees east of due south.