Exercise 1

Find the absolute value of the following vectors:

\( \mathbf{A} = (3, 3), \mathbf{B} = (1, -3), \mathbf{C} = (0, 2), \mathbf{D} = (5, 0), \mathbf{E} = (-1, -6) \)

Solution

We will use the Pythagorean theorem in order to solve this problem.

\[
|\mathbf{A}| = \sqrt{3^2 + 3^2} = \sqrt{9 + 9} = \sqrt{18} = 3\sqrt{2} \\
|\mathbf{B}| = \sqrt{1^2 + (-3)^2} = \sqrt{1 + 9} = \sqrt{10} \\
|\mathbf{C}| = \sqrt{0^2 + 2^2} = \sqrt{4} = 2 \\
|\mathbf{D}| = \sqrt{5^2 + 0^2} = \sqrt{25} = 5 \\
|\mathbf{E}| = \sqrt{(-1)^2 + (-6)^2} = \sqrt{1 + 36} = \sqrt{37}
\]

Exercise 2

Find the inner product of these two vectors:

\( \mathbf{A} = (1, 2), \mathbf{B} = (2, 6) \)

Solution

\[
\mathbf{A} \cdot \mathbf{B} = (1, 2) \cdot (2, 6) = 1 \cdot (-2) + 2 \cdot 6 = -2 + 12 = 10
\]

Exercise 3

Given the vectors \( \mathbf{A} = (2, 5), \mathbf{B} = (-3, 4) \) find:

a) \( 2\mathbf{A} + 3\mathbf{B} \)

b) \( -2\mathbf{A} - \frac{1}{2}\mathbf{B} \)

c) \( 2 \cdot \mathbf{A} \cdot \mathbf{B} \)