7.4 The Dot Product: An Algebraic View

Definition 7.4.1

Given vectors $\vec{a} = (a_1, a_2, a_3)$, $\vec{b} = (b_1, b_2, b_3)$, then

$\vec{a} \cdot \vec{b} =$ (for a proof see pg. 379 – 380)

Example 7.4.1

Given $\vec{a} = (3, 2)$ and $\vec{b} = (-5, 1)$ determine

a) $\vec{a} \cdot \vec{b}$ (***algebra***)

b) the angle between the vectors (***geometry***)

Example 7.4.2

Prove the commutative property for vectors in $\mathbb{R}^2$.

(*Note: we assume the commutative property true for numbers*)

Read example 1 on page 380 for a proof of the distributive property.

Example 7.4.3

Are $\vec{a} = (3, 2, -1)$ and $\vec{b} = (-1, 2, 3)$ perpendicular?

Example 7.4.4

Determine for what values of m $\vec{a} = (2m, m, 5)$ and $\vec{b} = (m, -3, -1)$ are perpendicular.

Example 7.4.5 **(This One Is Important)**

Determine a vector $\vec{v} = (x, y, z)$ which is perpendicular to **BOTH** of the vectors $\vec{a} = (1, 2, -1)$ and $\vec{b} = (3, 1, 1)$

Class/Homework for Section 7.4

Pg. 385 – 387 #1 – 5, 6bc, 7, 9b, 10 – 13, 14, 15, 17

See example 5