

Math 4133 - Linear Algebra

Quiz #6 - 2010.03.10

Solutions

Compute the following dot products:

1. $\langle 1, -3 \rangle \cdot \langle 3, 2 \rangle$

$$\langle 1, -3 \rangle \cdot \langle 3, 2 \rangle = 1 \cdot 3 + (-3) \cdot 2 = -3$$

2. $\langle 1, -2, 0, 3 \rangle \cdot \langle 5, -2, 0, 2 \rangle$

$$\langle 1, -2, 0, 3 \rangle \cdot \langle 5, -2, 0, 2 \rangle = 1 \cdot 5 + (-2) \cdot (-2) + 0 \cdot 0 + 3 \cdot 2 = 15$$

3. $\langle 1 + 2i, 3 - 4i \rangle \cdot \langle -2 - 3i, 4 + 2i \rangle$

$$\langle 1 + 2i, 3 - 4i \rangle \cdot \langle -2 - 3i, 4 + 2i \rangle = (1 + 2i) \cdot (-2 + 3i) + (3 - 4i) \cdot (4 - 2i) = -4 - 23i$$

How can the dot product be used to determine if two vectors are orthogonal?

If two vectors satisfy $\vec{u} \cdot \vec{v} = 0$, then they are orthogonal.

How can the dot product be used to find the magnitude of a vector?

To compute $|\vec{v}|$, we can use the formula $|\vec{v}|^2 = \vec{v} \cdot \vec{v}$