

Properties of the Dot Product

Similar to vector addition and scalar multiplication, there are many properties that hold true with the dot product.

Commutative

Scalar Multiplication

Distributive

Associative

***Recall that: $\vec{a} \cdot \vec{a} = |\vec{a}|^2$ (from yesterday) ***

The distributive property allows us to “expand and simplify” expressions with the dot product.

Examples

$$(2\vec{a} + \vec{b}) \cdot (3\vec{a} - \vec{b})$$

$$(2\hat{i} - \hat{j}) \cdot (3\hat{i} + 2\hat{j})$$

Expand and evaluate for $|\vec{a}| = 3$, $|\vec{b}| = 2$ and $\theta = 120^\circ$.

$$(2\vec{a} + 3\vec{b}) \cdot (4\vec{a} + 5\vec{b})$$

Two vectors $8\vec{u} - \vec{v}$ and $4\vec{u} + 3\vec{v}$ are perpendicular and the magnitude of \vec{v} is twice the magnitude of \vec{u} . Find the angle between vectors \vec{v} and \vec{u} .

Text page 179 #14, 15, 16, 17, 18, 19, 22, 23 (can be completed with exact values)