

Warmup #5: Dot Product

1. Find the dot product of $u = \langle 2, -2 \rangle$ and $v = \langle -3, 3 \rangle$.

$$\begin{aligned} 2 \cdot -3 + -2 \cdot 3 \\ -6 + -6 = \boxed{-12} \end{aligned}$$

2. Are the two vectors orthogonal?

$$u = -3i + 5j \text{ and } v = -5i - 3j$$

$$\begin{aligned} -3 \cdot -5 + 5 \cdot -3 \\ 15 - 15 = \boxed{0} \end{aligned} \quad \text{yes - orthogonal}$$

3. Find the dot product if $\|\vec{a}\| = 3$, $\|\vec{b}\| = 4$, and $\theta = 53^\circ$.
(Round to the nearest hundredth.)

$$\cos \theta = \frac{a \cdot b}{\|a\| \|b\|}$$

$$\cos 53^\circ = \frac{a \cdot b}{3 \cdot 4}$$

$$\cos 53^\circ = \frac{a \cdot b}{12}$$

$$12 \cos 53^\circ = a \cdot b$$

$$\boxed{7.22 = a \cdot b}$$