

## Warmup #5: Dot Product

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

$$2(-3) + -2(3)$$
$$-6 + -6 = \boxed{-12}$$

2. Are the two vectors orthogonal?

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

$$-3(-5) + 5(-3)$$

$$15 - 15 = 0 \quad \boxed{\text{yes!}}$$

3. Find the dot product if  $\|\vec{a}\| = 3$ ,  $\|\vec{b}\| = 4$ , and  $\theta = 53^\circ$

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

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

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

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

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