

## Dot Product

$$V = a_1 i + b_1 j \quad w = a_2 i + b_2 j$$

$$V \cdot w = a_1 a_2 + b_1 b_2$$

$$V = 3i + 2j$$

$$w = 12i + 8j \\ = 4(3i + 2j)$$

1.  $V = \sqrt{3}i + 3j \quad w = i + j$

a)  $V \cdot w = \sqrt{3}(1) + 3(1) \\ = \sqrt{3} + 3$

b)  $\cos \theta = \frac{V \cdot w}{\|V\| \cdot \|w\|}$

$$\cos \theta = \frac{\sqrt{3} + 3}{\sqrt{(\sqrt{3})^2 + 3^2} \sqrt{1^2 + 1^2}}$$

$$\cos \theta = \frac{\sqrt{3} + 3}{\sqrt{3+9} \sqrt{1+1}}$$

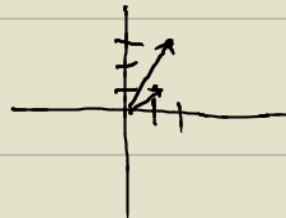
$$\cos \theta = \frac{\sqrt{3} + 3}{\sqrt{12} \sqrt{2}}$$

$$\cos \theta = \frac{\sqrt{3} + 3}{\sqrt{24}}$$

$$\theta = \cos^{-1} \left( \frac{\sqrt{3} + 3}{\sqrt{24}} \right)$$

$\theta = 15^\circ$

c) NEITHER



2.  $V = 5i + j \quad w = -2i + 4j$

a)  $V \cdot w = 5(-2) + 1(4) \\ = -10 + 4 \\ = -6$

b)  $\cos \theta = \frac{V \cdot w}{\|V\| \cdot \|w\|}$

$$\cos \theta = \frac{-6}{\sqrt{5^2 + 1^2} \sqrt{(-2)^2 + 4^2}}$$

$$\cos \theta = \frac{-6}{\sqrt{26} \sqrt{20}}$$

$$\cos \theta = \frac{-6}{\sqrt{520}}$$

$$\theta = \cos^{-1} \left( \frac{-6}{\sqrt{520}} \right)$$

$\theta = 105.3^\circ$

c) NEITHER

