

$$\vec{v} = a_1 \vec{i} + b_1 \vec{j} + c_1 \vec{k} \quad w = a_2 \vec{i} + b_2 \vec{j} + c_2 \vec{k}$$

$$\vec{v} \cdot \vec{w} = a_1 a_2 + b_1 b_2 + c_1 c_2$$

mit  
PROMPT

$$\cos \theta = \frac{\vec{v} \cdot \vec{w}}{\|\vec{v}\| \times \|\vec{w}\|}$$

11.  $v = i + k \quad w = -i - j + k$

$$v \cdot w = \underbrace{1(-1)}_{i's} + \underbrace{(0)(-1)}_{j's} + \underbrace{(1)(1)}_{k's}$$

$$= -1 + 1$$

$$= 0$$

$$\cos \theta = \frac{v \cdot w}{\|v\| \times \|w\|}$$

$$\cos \theta = \frac{0}{\text{ANYTHING}}$$

$$\cos \theta = 0$$

$$\cos^{-1}(\cos \theta) = \cos^{-1}(0)$$

$$\theta = \cos^{-1}(0)$$

$$\theta = 90^\circ$$

12.  $v = 2i - 3j + k \quad w = i - 4j + 2k$

$$v \cdot w = 2(1) + (-3)(-4) + 1(2)$$

$$= 2 + 12 + 2$$

$$= 16$$

$$\cos \theta = \frac{v \cdot w}{\|v\| \times \|w\|}$$

$$\cos \theta = \frac{16}{\sqrt{2^2 + (-3)^2 + 1^2} \sqrt{1^2 + (-4)^2 + 2^2}}$$

$$\theta = \cos^{-1} \left( \frac{16}{\sqrt{14} \sqrt{21}} \right)$$

$$\theta = 21.1^\circ$$