

L2: 12.3, 12.4 pdf Quiz

10/3/20

1. Determine whether the 2 vectors are orthogonal & if not, whether the \angle between them is acute or obtuse

a. $\langle 1, 1, 1 \rangle, \langle 3, -2, -1 \rangle$

$$\langle 1, 1, 1 \rangle \cdot \langle 3, -2, -1 \rangle = 1 \cdot 3 + 1 \cdot (-2) + 1 \cdot (-1) = 3 - 2 - 1 = 0$$

Dot product = 0 \Rightarrow vectors are \perp

b. $\langle 4, 3 \rangle, \langle 2, -4 \rangle$

$$\langle 4, 3 \rangle \cdot \langle 2, -4 \rangle = 4 \cdot 2 + 3 \cdot (-4) = 8 - 12 = -4$$

Dot product $\neq 0 \Rightarrow$ vectors aren't \perp

Dot product = (-) $\Rightarrow \angle$ is obtuse

2. Calculate $v \times w$, if $v = \langle 0, 1, -1 \rangle$ & $w = \langle 1, -1, 0 \rangle$

$$v \times w = \begin{vmatrix} i & j & k \\ 0 & 1 & -1 \\ 1 & -1 & 0 \end{vmatrix} =$$

$$i \begin{vmatrix} 1 & -1 \\ -1 & 0 \end{vmatrix} - j \begin{vmatrix} 0 & -1 \\ 1 & 0 \end{vmatrix} + k \begin{vmatrix} 0 & 1 \\ 1 & -1 \end{vmatrix} =$$

$$i(1 \cdot 0 - (-1)) - j(0 \cdot 0 - (-1) \cdot (1)) + k(0 \cdot (-1) - (1) \cdot (1)) =$$
$$-i - j - k$$

Convert to usual notation $\Rightarrow \langle -1, -1, -1 \rangle$