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Section 22

9/10/20

Lecture 2 Quiz

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

$$(1)(3) + (1)(-2) + (1)(-1)$$

$$3 + -2 + -1 = 0$$

Since it is 0, it is orthogonal

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

$$(4)(2) + (3)(-4)$$

$$8 - 12 = -4$$

It is not 0, so it is not orthogonal

$$\cos \theta = \frac{-4}{|A||B|}$$

$$|A| = \sqrt{4^2 + 3^2} = \sqrt{16 + 9} = \sqrt{25} = 5$$

$$|B| = \sqrt{2^2 + (-4)^2} = \sqrt{4 + 16} = \sqrt{20}$$

$$\cos \theta = \frac{-4}{5\sqrt{20}}$$

$$\theta = \arccos\left(\frac{-4}{5\sqrt{20}}\right)$$

$$\theta = 1.75 \text{ rad}$$

2. $v = \langle 0, 1, -1 \rangle$, $w = \langle 1, -1, 0 \rangle$

$$\begin{bmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 1 & -1 \\ 1 & -1 & 0 \end{bmatrix}$$

$$\hat{i}((1)(0) - (-1)(-1)) - \hat{j}((0)(0) - (-1)(1)) + \hat{k}((0)(-1) - (1)(1))$$

$$\hat{i}(0 - 1) - \hat{j}(1) + \hat{k}(-1)$$

$$\hat{i}(-1) - \hat{j}(1) + \hat{k}(-1)$$

$$= \langle -1, -1, -1 \rangle$$