

"QUIZ" for Lecture 2

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E-MAIL ADDRESS SCANNED .pdf OF COMPLETED QUIZ to DrZcalc3@gmail.com
(Attachment: q2FirstLast.pdf) ASAP BUT NO LATER THAN FRIDAY Sept. 11,
8:00pm _____

1. Determine whether the two vectors are orthogonal and if not, whether the angle between them is acute or obtuse. a. $\langle 1, 1, 1 \rangle$, $\langle 3, -2, -1 \rangle$.

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

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

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

$$= 3 - 2 - 1 = 0 \rightarrow \text{vectors are orthogonal}$$

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

$$\langle 4, 3 \rangle = u \quad \langle 2, -4 \rangle = v$$

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

$$= 8 - 12 = -4 \rightarrow \text{not orthogonal}$$

$$\cos(\theta) = \frac{-4}{(|u| \cdot |v|)}$$

$$|u| = \sqrt{4^2 + 3^2} = \sqrt{25} = 5$$

$$|v| = \sqrt{2^2 + (-4)^2} = \sqrt{20} = 2\sqrt{5}$$

$$\cos(\theta) = \frac{-4}{5 \cdot 2\sqrt{5}}$$

$$\theta = \cos^{-1}\left(\frac{-2}{5\sqrt{5}}\right)$$

$$\theta = 100.305^\circ$$

2. Calculate $\mathbf{v} \times \mathbf{w}$, if

$$\mathbf{v} = \langle 0, 1, -1 \rangle \quad , \quad \mathbf{w} = \langle 1, -1, 0 \rangle .$$

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

$$= (-1)i - (1)j + (-1)k$$

$$= -i - j - k = \boxed{\langle -1, -1, -1 \rangle}$$