

"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) $\langle 1, 1, 1 \rangle$, $\langle 3, -2, -1 \rangle$ $\cos \theta = \frac{(1 \cdot 3) + (1 \cdot -2) + (1 \cdot -1)}{\sqrt{1^2 + 1^2 + 1^2} \cdot \sqrt{3^2 + (-2)^2 + (-1)^2}} = \frac{0}{\sqrt{4} \cdot \sqrt{14}} = 0$

$\cos \theta = 0$ so θ must equal $\frac{\pi}{2}$ proving that these 2 vectors are orthogonal

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

$$\cos \theta = \frac{(4 \cdot 2) + (3 \cdot -4)}{\sqrt{4^2 + 3^2} \cdot \sqrt{2^2 + (-4)^2}} = \frac{-4}{\sqrt{25} \cdot \sqrt{20}} = \frac{-4}{5\sqrt{20}} = \frac{-4}{10\sqrt{5}} = \frac{-2}{5\sqrt{5}}$$

$$\cos^{-1}\left(\frac{-2}{5\sqrt{5}}\right) = 1.7506 \text{ radians} = \theta$$

$= 100.304^\circ \rightarrow$ Obtuse Angle

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

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

$$\mathbf{v} = 0\mathbf{i} + 1\mathbf{j} - 1\mathbf{k}$$

$$\mathbf{w} = 1\mathbf{i} - 1\mathbf{j} + 0\mathbf{k}$$

$$\begin{aligned} \mathbf{v} \times \mathbf{w} &= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 0 & 1 & -1 \\ 1 & -1 & 0 \end{vmatrix} = \mathbf{i} \begin{vmatrix} 1 & -1 \\ -1 & 0 \end{vmatrix} - \mathbf{j} \begin{vmatrix} 0 & -1 \\ 1 & 0 \end{vmatrix} + \mathbf{k} \begin{vmatrix} 0 & 1 \\ 1 & -1 \end{vmatrix} \\ &= \mathbf{i}(0 - 1) - \mathbf{j}(0 - (-1)) + \mathbf{k}(0 - 1) \\ &= -\mathbf{i} - \mathbf{j} - \mathbf{k} \\ &= \langle -1, -1, -1 \rangle \end{aligned}$$