

"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 Sg1563@scarletmail.rutgers.edu

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. when  $u = \langle 1, 1, 1 \rangle$  and  $v = \langle 3, -2, -1 \rangle$

$$u \cdot v = \langle 3, -2, -1 \rangle \Rightarrow 0$$

$$\|u\| = \sqrt{3} \quad \|v\| = \sqrt{14} \quad \|u\|\|v\| = \sqrt{42}$$

$$\cos \theta = \frac{u \cdot v}{\|u\|\|v\|} = \frac{0}{\sqrt{42}} = 0$$

$$\theta = \cos^{-1}(0) = 90^\circ$$

Is orthogonal.

b. when  $u = \langle 4, 3 \rangle$  and  $v = \langle 2, -4 \rangle$

$$u \cdot v = \langle 8, -12 \rangle \Rightarrow -4$$

$$\|u\| = 5 \quad \|v\| = 2\sqrt{5} \quad \|u\|\|v\| = 10\sqrt{5}$$

$$\cos \theta = \frac{u \cdot v}{\|u\|\|v\|} = \frac{-4}{10\sqrt{5}}$$

$$\theta = \cos^{-1}\left(\frac{-4}{10\sqrt{5}}\right) \approx 100.3^\circ$$

Not orthogonal

Obtuse angle

2. Calculate  $v \times w$ , if

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

$$\vec{v} \cdot \vec{w} = 0(1) + 1(-1) - 1(0)$$

$$= 0 - 1 - 0 = \underline{-1}$$