MATH 251: Quiz 1

September 10, 2015

Name: Solutions Sec: _____

1. Find the components of the vector $\vec{u}$ that has base point $(4, -6, -1)$ and terminal point $(5, -2, 4)$.

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$\vec{u} = \langle 5-4, -2-6, 4-(-1) \rangle = \langle 1, 4, 5 \rangle$

2. Let $\vec{v} = \langle 3, 12, -4 \rangle$ and $\vec{w} = \langle 2, -1, 2 \rangle$.

(a) Calculate $5\vec{v} - 2\vec{w}$.

(b) Calculate $\vec{v} \cdot \vec{w}$.

(c) Find the angle between v and w. You can leave this answer as an inverse cosine.

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(a) $5\vec{v} - 2\vec{w} = 5\langle 3, 12, -4 \rangle - 2\langle 2, -1, 2 \rangle$

$= \langle 15, 60, -20 \rangle - \langle 4, -2, 4 \rangle$

$= \langle 11, 62, -24 \rangle$

(b) $\vec{v} \cdot \vec{w} = 3 \cdot 2 + 12 \cdot -1 + -4 \cdot 2$

$= 6 - 12 - 8 = -14$

(c) $\|\vec{v}\| = 13 \quad \|\vec{w}\| = 3$

$\cos\theta = \frac{-14}{39}$

3. Determine whether the lines $\vec{r_1}$ and $\vec{r_2}$ intersect, where

$$\vec{r_1}(t) = \langle -1-t, 1-3t, t-1\rangle \qquad \vec{r_2}(t) = \langle -2+2t, -1+5t, -3+t\rangle.$$

If they do, find the point of intersection. If they do not, state this.

/3

x: $-1-t = -2+2s$

y: $1-3t = -1+5s$

z: $t-1 = s-3$.

$t = s-2$

$-1+2-s = -2+2s$

$1-s = -2+2s$

$3 = 3s \qquad s = 1 \qquad t = -1$

Plug into y:

$1-3(-1) = 4$

$-1+5(1) = 4$ ✓ They intersect!

Point: $\vec{r_2}(1) = \langle -2+2, -1+5, -3+1\rangle = \boxed{\langle 0, 4, -2\rangle}$