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MATH 251: Quiz 1

January 29, 2015

Name: Solutions Sec: _____

1. Find the components of the vector $\vec{u}$ that has base point $(1, -8, 2)$ and terminal point $(5, 0, 4)$.

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$(5,0,4) - (1,-8,2) = \langle 4, 8, 2 \rangle$ (1)

2. Given vectors $\vec{v} = \langle 1, 3 \rangle$ and $\vec{w} = \langle -2, 2 \rangle$, compute the following:

(a) $4\vec{v} - 2\vec{w}$

(b) $e_{\vec{v}}$, where this denotes the unit vector in the same direction as $\vec{v}$.

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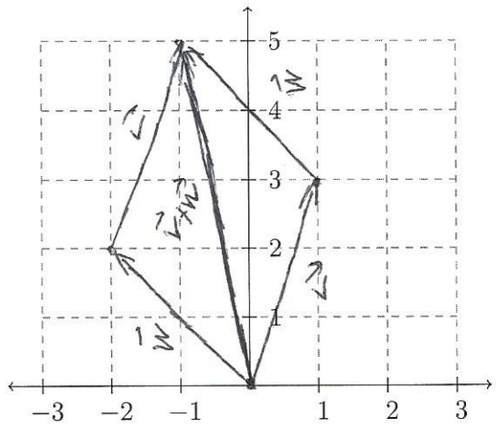
(c) On the axes below, draw a parallelogram to represent $\vec{v} + \vec{w}$. There should be at least three arrows on your picture.



(2)

(a) $4\vec{v} - 2\vec{w} = \langle 4, 12 \rangle - \langle -4, 4 \rangle = \langle 8, 8 \rangle$ (1)

(b) $\|\vec{v}\| = \sqrt{1+9} = \sqrt{10}$

$e_{\vec{v}} = \left\langle \frac{1}{\sqrt{10}}, \frac{3}{\sqrt{10}} \right\rangle$ (2)

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

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

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

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$-3+t = x = 2+2s$ (1)

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

$-t = z = -3 \Rightarrow t = 3$

$-3+3-2+2s = 0$ (1)

$s = -1$

y equation:

$-5+3(3) = -5+9 = 4$ ✓ (1)

$-1-5(-1) = -1+5 = 4$

So they intersect at $t = 3$.

$r_1(3) = \langle -3+3, -5+9, -3 \rangle = \langle 0, 4, -3 \rangle$ (1)