Math 273 | Quiz 1 | Name: _____

2 Sept 2016 | Show appropriate work. | Point Values in boxes.

1. [2] Find a unit vector in the direction opposite the given vector.

$\mathbf{u} = \langle 3, -4 \rangle$ $\quad \|\vec{u}\| = \sqrt{9+16} = 5$

$\vec{e}_{-\vec{u}} = -\frac{1}{5}\langle 3, -4 \rangle$

- or -

$= \langle -\frac{3}{5}, \frac{4}{5} \rangle$

2. [3] Find a vector parameterization of the line passing through the points $(1, 2, 3)$ and $(3, 2, -4)$.

direction $\langle 2, 0, -7 \rangle$ so

$\vec{r}(t) = \langle 1, 2, 3 \rangle + t\langle 2, 0, -7 \rangle$

- or -

$\langle 3, 2, -4 \rangle + t\langle 2, 0, -7 \rangle$ or ...

[5]

3. Determine if the following lines intersect, if so, find the point of intersection.

$\mathbf{r_1(t)} = \langle 1, 2, 3 \rangle + t\langle 2, 1, 3 \rangle, \qquad \mathbf{r_2(s)} = \langle -6, -6, 0 \rangle + s\langle 1, 2, -1 \rangle$

x: $1 + 2t = -6 + s$

y: $2 + t = -6 + 2s$

z: $3 + 3t = -s \longrightarrow$ so $s = -3 - 3t$

substituting into x gives

$1 + 2t = -6 - 3 - 3t$

$5t = -10$ so $t = -2$

so $s = 3$

does it work for y?

$2 + (-2) \stackrel{?}{=} -6 + 6$ yes! $0 = 0$, so they intersect

at $\vec{r}_1(-2) = \vec{r}_2(3) = \langle -3, 0, -3 \rangle$