Math 273 | Quiz 2 | Name: ____________

22 Jan 2016 | Show appropriate work. | Point Values in $\boxed{\text{boxes}}$.

$\boxed{1}$ Proper use of notation is required (and worth 1 point).

1. Consider the points $P = (1, 1, 3)$ and $Q = (3, -1, 4)$.

   (a) $\boxed{1}$ Find the vector $\overrightarrow{PQ}$.

   $\overrightarrow{PQ} = \langle 2, -2, 1 \rangle$

   (b) $\boxed{1}$ Find a unit vector in the direction of $\overrightarrow{PQ}$.

   $\vec{e}_{\overrightarrow{PQ}} = \frac{1}{3}\langle 2, -2, 1 \rangle$ since $\|\overrightarrow{PQ}\| = \sqrt{4+4+1} = 3$

   (c) $\boxed{1}$ Find a parametric representation of the line through $P$ and $Q$.

   $x = 1 + 2t$

   $y = 1 - 2t$

   $z = 3 + t$

   (d) $\boxed{1}$ Find a vector representation of the line through $P$ and $Q$.

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

2. $\boxed{2}$ Is the angle between the vectors $\mathbf{u} = < 1, 2, 3 >$ and $\mathbf{v} = < 3, -1, -1 >$ acute, right, or obtuse?

   $\vec{u} \cdot \vec{v} = 3 - 2 - 3 = -2 < 0$, so obtuse

3. $\boxed{2}$ Find $x$ so that the vectors $\mathbf{u} = < x, 2 >$ and $\mathbf{v} = < 3, 1 - x >$ are orthogonal.

   $\vec{u} \cdot \vec{v} = 3x + 2 - 2x$ $\quad$ $\vec{u}$ & $\vec{v}$ are orthogonal iff $\vec{u} \cdot \vec{v} = 0$,

   so $x + 2 = 0$ or $\underline{x = -2}$