Assignment on Lines

1. Find the vector and parametric equations for the line through the point $P = (2, 5, -1)$ and parallel to the vector $\mathbf{v} = (-3, 1, 2)$.

2. Find the vector and parametric equations for the line through the point $P = (5, 8, -6)$ and parallel to the vector $\mathbf{v} = 2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}$.

3. Find the vector and parametric equations for the line through the points $P = (4, 1, -8)$ and $Q = (2, 3, 5)$.

4. Find the angle between the lines l_1 and l_2 given by:
   $l_1 : \mathbf{r} = (1 - 2t, 3 + t, 4 - 5t)$ and $l_2 : \mathbf{r} = (-1 - s, 4 - 2s, -1 + 2s)$.

5. Find the parametric equations of the line through $(3, -1, 2)$ and parallel to the line $\mathbf{r} = (2 - 3t, 7 + t, 8 + 5t)$.

6. Find the vector form of the line through the point $(5, 2, -3)$ and orthogonal (orthogonal is a \$25 word for perpendicular) to the lines $\mathbf{r} = (2 + t, 3 - 2t, 4 - 5t)$ and $\mathbf{r} = (1 - t, 2t, 3 + 4t)$.

7. Determine whether the lines l_1 and l_2 are parallel, skew, or intersecting. If they intersect, find their point of intersection.

   (a) l_1: $x = 4 - t$, $y = 2t$, $z = 3 + 4t$, and l_2: $x = 2 + 3s$, $y = 1 - s$, $z = 4 + s$.

   (b) l_2: $\mathbf{r} = (3 - 4t, 2 + t, 2t)$, and $\mathbf{r} = (3 + 2s, 1 - s, 8 + 3s)$