Math 304 Quiz 1

To receive full credit, you must show all work.

**Question 1** [5 points] Given the points \( P = (2, 1, 0) \) and \( Q = (-1, 2, 4) \), find a unit vector that points in the opposite direction as \( \overrightarrow{PQ} \).

**Question 2** [5 points] For which value(s) of \( t \) are the vectors \( (t - 2)i - 2j + 3k \) and \( ti + (t - 5)j - 5k \) orthogonal?

**Question 3** [5 points] Find the equation of the plane containing the point \((3, 2, 1)\) and the line \( l(t) = (0, 1, -1) + t(-2, 1, 2) \).

**Question 4** [5 points] Do the two lines \( l_1(t) = \left( \frac{8}{3}, \frac{1}{3}, 2 \right) + t(1, 2, 3) \) and \( l_2(t) = (4, -2, -\frac{2}{3}) + t(-1, 1, 1) \) intersect? If so, where?