Problem Set #1
Due: Wednesday, January 18

1. Consider a molecule with four atoms at the points \((0, 0, 0)\), \((6, 0, 0)\), \((3, \sqrt{3}, 2\sqrt{6})\) and \((3\sqrt{3}, 0)\). Verify that every atom in this molecule is 6 units away from every other atom.

2. Let \(P = (1, 2, 3)\) and \(Q = (3, 4, 2)\).
   (a) Find the distance between \(P\) and \(Q\).
   (b) Find a unit vector from the point \(P\) and toward the point \(Q\).
   (c) Find a vector of length 9 pointing in the same direction of \(\overrightarrow{PQ}\).
   (d) Find a point \(R\) such that \(\overrightarrow{PR}\) is a vector of length 12 pointing in the opposite direction of \(\overrightarrow{PQ}\).

3. Let \(\vec{u} = <1, 1>\) and \(\vec{v} = <-2, 1>\).
   Describe the set of vectors \(\{\vec{w} = s\vec{u} + t\vec{v} | 0 \leq s \leq 1, 0 \leq t \leq 1\}\) geometrically.