Chapter 16 Homework Assignment P-Chem Math

On separate piece of paper, evaluate each problem given below. Make sure to show all of your work (in other words, don’t use a computer to do the work for you). 13 points total

You will only receive credit if you show all your work and it truly leads to the correct answer.

1. Given P(1,0,-3) & Q(0,0,0)
   a.) Find the vector \( \overrightarrow{PQ} \).  
   b.) Find the length of vector \( \overrightarrow{PQ} \).

2. For \( a = (1,2,3), b = (-2,3,-4), \) and \( c = (0,4,-1) \), find \( 3a + 2b - 3c \).

3. Find the resultant of the forces of \( \vec{F}_1 = 2i - 3j + k \) & \( \vec{F}_2 = 2j - k \).

4. Three charges \( q_1 = 3, q_2 = -2, \) and \( q_3 = 1 \), have position vectors \( \vec{r}_1 = 2i + 2j + k, \)
   \( \vec{r}_2 = 2i - 2j + 3k, \) & \( \vec{r}_3 = -4j - 3k, \) respectively. Find the dipole moment of the system
   with respect to the origin.

5. A body of mass \( m \) moves along the curve \( \vec{r}(t) = x(t)i + y(t)j + z(t)k \) where \( x = 2\cos 3t, \)
   \( y = 2\sin 3t \) and \( z = 3t \) and \( t \) is time. Find a.) the velocity & acceleration at time \( t \) and b.) direction of the force.

6. For \( a = (1,3,-2), b = (0,3,1) \) & \( c = (1,-1,-3) \), find
   a.) \( (a - b) \cdot c, \quad a \cdot c - b \cdot c \)  
   b.) \( b \cdot c \)

7. For \( a = (1,3,-2), b = (0,3,1) \) & \( c = (0,-1,2) \), find \( a \times (b \times c) \) & \( (a \times b) \times c \)