Vector analysis Quiz 2, 5/20/10

Name:

Question 1
Let $A = (4, -1, -3), B = (2, -5, -1), C = (20, -9, 5), D = (-6, 4, -8)$ be points in space.

- Prove that the four points $A, B, C$ and $D$ are co-planar and find the equation of the plane containing them.
- Find the centroid of the quadrilateral $ABCD$.

Question 2
Let $A = (4, -1, -3), B = (2, -5, -1), C = (7, 2, 13), D = (-6, 4, -8)$ be points in space.

- Find the area of the triangle $ABD$.
- Find the equation of the plane $ABD$.
- Find the distance of the point $C$ from the plane $ABD$.
- Find the volume of the tetrahedron $ABCD$.

Question 3
A particle in space has position $\vec{X}$ at time $t$, given by the parametric equations:

$$\vec{X} = \sin(t)[10, 10, 5] + \cos(t)[5, 2, -14].$$

- Find the velocity, speed and acceleration of the particle.
- Find the length of the trajectory around one complete orbit.
- Describe the shape of the trajectory of the particle.
- Show that the motion is planar and find the equation of the plane of motion.