1. Let P(-3,4,5), Q(-2,4,6) and R(-3,5,6) be three points in space.
   a) Find the angle in degrees at the vertex Q of the triangle with vertices P, Q and R.

   b) Find the area of the triangle with vertices P, Q and R.
c) Find the equation of the plane containing the points P, Q and R.

d) Find the equation of the line through Q which is perpendicular to the plane containing the triangle with vertices P, Q and R.
2. Let \( \mathbf{u} = 3\mathbf{i} - 5\mathbf{j} + \mathbf{k} \), \( \mathbf{v} = 2\mathbf{j} - 2\mathbf{k} \) and \( \mathbf{w} = 3\mathbf{i} + \mathbf{j} + \mathbf{k} \) be three given vectors in space.

a) Find the area of the parallelogram determined by the vectors \( \mathbf{u} \) and \( \mathbf{v} \).

b) Find the volume of the parallelepiped determined by the vectors \( \mathbf{u}, \mathbf{v} \) and \( \mathbf{w} \).
3. Find $\mathbf{r}(t)$ and $\mathbf{r}'(t)$ for the given conditions: $\mathbf{r}'(t) = - (4 \sin t) \mathbf{j} - (4 \cos t) \mathbf{k}$, 
$\mathbf{r}'(0) = 3\mathbf{i} + 4\mathbf{j}$ and $\mathbf{r}''(0) = -4\mathbf{k}$. 
4. a) Find the parametric equation of the line passing through the point (3, -1, 2) and perpendicular to the plane $3x + 4y - 6z = 12$.

b) Find the equation of the plane which passes through the point (4, 1, -3) and is perpendicular to the line $(x - 1)/2 = (y + 4)/(-3) = z/6$.