25) 1. The points $P(1,2,1)$, $Q(1,4,2)$ and $R(2,-1,3)$ in 3-space determine a triangle having $P, Q$ and $R$ as its vertices.

a) Find the angle at the vertex $P$ in degrees.

b) Calculate the area of the triangle.

c) Find the equation of the plane which contains the triangle.
10) 2. a) Find parametric equations for the line $L$ which passes through the point $(x,y,z) = (1,2,3)$ and is perpendicular to the plane $2x - 3y + z = 13$.

b) Find the point where the line $L$ from part a) intersects the plane $2x - 3y + z = 13$. 
30) 3. An object is moving in 3-space according to the parametric equations 
   \[ x = t, \ y = 2t, \ z = tsint \]  where \( t \) is the time in seconds.

   a) Find as functions of \( t \),

   position vector \( \mathbf{r} = \)

   velocity vector \( \mathbf{v} = \)

   acceleration vector \( \mathbf{a} = \)

   speed =

   b) When \( t = \frac{T}{2} \) seconds find

   the tangential component of acceleration \( a_T \)

   the normal component of acceleration \( a_N \)

   the curvature \( K \)
15) An object is moving in the plane in such a way that its acceleration vector is $a = \mathbf{i} - (\sin t)\mathbf{j}$ where $t$ is the time. Suppose that at time $t = 0$ its velocity vector is $\mathbf{v}(0) = \mathbf{i} + \mathbf{j}$ and its position vector is $\mathbf{r}(0) = \mathbf{j}$. Find the velocity vector and the position vector as functions of $t$ and give the parametric equations for the motion.