Tutorial Worksheet 2

Show all your work.

1. Let ℓ be the intersection of the planes given by equations $2x - 4y + z = 0$ and $3x - y - 2z + 9 = 0$. Find an equation for ℓ in the form $\mathbf{r}(t) = \mathbf{r}_0 + t\mathbf{v}$.

2. A point moves in space in such a way that at time t its position is given by the vector-valued function $\mathbf{r}(t) = \left\langle t^2 + t + 1, -\frac{7}{2}t, -t + 4 \right\rangle$. At what time(s) does the point hit the plane $x + 2y + z = -5$?

3. Determine the *speed* at $t = 2$ of an object whose position function is $\mathbf{r}(t) = \langle t^2 + 1, t^3, t^2 - 1 \rangle$.

4. Find an equation of the plane perpendicular to the line $x = 2016$, $y = 1 - 7t$, $z = 89 + 8t$ passing through the point $(1, 1, 1)$.

5. The initial position and velocity of an object moving with acceleration $\mathbf{a} = \mathbf{i} + 2\mathbf{j} + 6t\mathbf{k}$ are $\mathbf{r}(0) = \mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ and $\mathbf{v}(0) = \mathbf{j} - \mathbf{k}$. Find its position at time t.

6. Find the distance from the point $(2, -2, 3)$ to the plane $6x + 4y - 3z = 2$.

7. Find the acute angle of the intersection of the two curves $\mathbf{a}(u) = \langle 1 - u, u + 2, -3u \rangle$ and $\mathbf{b}(v) = \langle v, 2v, v^2 - v \rangle$.