

Solutions

Math 2551 (L1-L3)
1/27/2016

Quiz 2

8 pts. — 1. Let L be the line in space passing through the point $(2, -3, -1)$ and parallel to the vector $\vec{v} = 2\vec{i} + 4\vec{j} + 5\vec{k}$.

a). Write the parametric equations for the line L .

b). Find the point where the line L meets the plane $x + y + z = -13$.

4 pts. — 2. Find the velocity $\vec{v}(t)$ and acceleration $\vec{a}(t)$ along the curve:

$$\vec{r}(t) = 2 \cos t \vec{i} + 2 \sin t \vec{j} + 2t \vec{k}.$$

8 pts. — 3. Find parametric equations for the line tangent to the curve:

$$\vec{r}(t) = (4 \cos t) \vec{i} + (t^2 - 6 \sin t) \vec{j} + (e^{4t}) \vec{k}$$

at the value $t = 0$ of the parameter.

① (a). $\begin{cases} x = 2 + 2t \\ y = -3 + 4t \\ z = -1 + 5t \end{cases}$
(4 pts.)

(b). $(2+2t) + (-3+4t) + (-1+5t) = -13$

$$\begin{aligned} -2 + 11t &= -13 \\ 11t &= -11 \end{aligned}$$

$t = -1$ (2 pts.)

$\Rightarrow x = 0; y = -7; z = -6$ $(0, -7, -6)$ (2 pts.)
Point of intersection

② $\vec{v}(t) = \langle -2 \sin t, 2 \cos t, 2 \rangle$ (2 pts.)

$\vec{a}(t) = \langle -2 \cos t, -2 \sin t, 0 \rangle$ (2 pts.)

③ $\vec{v}(t) = \langle -4 \sin t, 2t - 6 \cos t, 4e^{4t} \rangle$ (2 pts.)

$\Rightarrow \vec{v}(0) = \langle 0, -6, 4 \rangle$ (parallel vector) (2 pts.)

$\vec{r}(0) = \langle 4, 0, 1 \rangle \Rightarrow (4, 0, 1)$ point on the line (2 pts.)

$\Rightarrow \begin{cases} x = 4 \\ y = -6t \\ z = 1 + 4t \end{cases}$ (2 pts.)