

Math 53 Discussion

Practice Problems: vector functions, velocity, acceleration

1) Find a vector function that represents the curve of the intersection of the cone $z = \sqrt{x^2 + y^2}$ and the plane $z = 1 + y$.

2) Find the tangent vector $\vec{r}'(t)$ for the curve $\vec{r}(t) = \langle t^2, \cos 2t, -te^t \rangle$. Find the equation of the tangent line to the curve at $t = 0$.

Over for questions 3), 4) and 5) →

3) Find the velocity, acceleration, and speed of a particle with the position function $\vec{r}(t) = e^t(\cos t \hat{i} + \sin t \hat{j} + t \hat{k})$.

4) Find the velocity and position vectors of a particle that has acceleration $\vec{a}(t) = \hat{i} + 2\hat{j}$, $\vec{v}(0) = \hat{k}$, $\vec{r}(0) = \hat{i}$.

5*) The position function of a spaceship is

$$\vec{r}(t) = (3 + t)\hat{i} + (2 + \ln t)\hat{j} + \left(7 - \frac{4}{t^2 + 1}\right)\hat{k}$$

and the coordinates of a space station are (6, 4, 9). The captain wants the spaceship to coast into the space station. When should the engines be turned off?