

Please PRINT your name _____

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work correct, complete and coherent.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 3, October 2, 2018

An object is moving in three-space. The position vector of the object at time t is

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

Find parametric equations for the line tangent to the path of the object at time $t = 0$.

ANSWER: The position vector of the object at time zero is

$$\vec{r}(0) = -\vec{j} + \vec{k};$$

hence, at $t = 0$, the object is sitting on the point $(0, -1, 1)$. The velocity vector at time t is $\vec{r}'(t) = \cos(t) \vec{i} + (2t + \sin t) \vec{j} + e^t \vec{k}$. So the vector

$$\vec{r}'(0) = \vec{i} + \vec{k}$$

is tangent to the curve at $t = 0$. The answer is the line which passes through $(0, -1, 1)$ and is parallel to $\vec{i} + \vec{k}$:

$$\begin{cases} x = 0 + t \\ y = -1 + 0t \\ z = 1 + t. \end{cases}$$