Name:

1. Consider the vector-valued function

$$\mathbf{r}(t) = t^3\mathbf{i} + e^{2t}\mathbf{j} + \cos(2t)\mathbf{k}$$

Compute $\mathbf{r}'(t)$

2. The function in the problem 1 desribes the position of a particle as a function of time. The **i** and **j** directions are horizontal and the **k** direction is vertical. List 3 different times when the particle is moving only in a horizontal direction.

3. A vector-valued function has **derivative**

$$\mathbf{r}'(t) = te^{t^2}\mathbf{i} + \sin(3t)\mathbf{j}.$$

We are given the additional data $\mathbf{r}(0) = 2\mathbf{j}$. Determine $\mathbf{r}(t)$.

4. Find an equation for the tangent line of the curve $\mathbf{r}(t) = e^{2t}\mathbf{i} + e^{t}\mathbf{j}$.