

Name: _____

ID: _____

1. Consider the vector-valued function

$$\mathbf{r}(t) = (1 + t^3)\mathbf{i} + te^{-t}\mathbf{j} + \sin(2t)\mathbf{k}.$$

- (a) Find the derivative of $\mathbf{r}(t)$.

- (b) Find the unit tangent vector at the point where $t = 0$.

2. Consider the helix with vector equation

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

Find the length of the helix from the point $(1, 0, 0)$ to the point $(1, 0, 2\pi)$.