Math 233 - Quiz 4

Name _____

February 19, 2026

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3.5 points) Find $\vec{r}(t)$ if $\vec{r}\,'(t) = -8\cos(4t)\,\hat{\imath} + te^{-t^2}\,\hat{\jmath} + \dfrac{3}{t^2+1}\,\hat{k}$ and $\vec{r}(0) = 4\hat{\imath} + 3\hat{\jmath} - 2\hat{k}$.

2. (3.5 points) For $t > 0$, let $\vec{r}(t) = (\cos t + t\sin t)\hat{\imath} + (\sin t - t\cos t)\hat{\jmath}$. Compute the unit tangent vector, $\hat{T}(t)$.

3. (3 points) Let $\vec{r}(t) = t^2\,\hat{\imath} + t^3\,\hat{\jmath} + t\,\hat{k}$. Set up the definite integral that gives the length of the graph of $\vec{r}$ from the point $(0, 0, 0)$ to the point $(4, 8, 2)$. Use your calculator to approximate the value of your integral.