Math 233 - Quiz 4

Name _____

September 21, 2023

Score _____

Show all work to receive full credit. Supply explanations when necessary. This quiz is due September 26.

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

2. (2 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, $\hat{T}(t)$.

Turn over.

3. (2 points) Find a vector-valued function whose graph is the line segment from $(1, -3, 5)$ and $(8, 9, -2)$.

4. (2 points) An object starts from rest at the point $P\,(1, 2, 0)$ and moves with acceleration $\vec{a}(t) = \hat{\jmath} + 2\hat{k}$, where distances are measured in feet and time in seconds. Find the location of the object after 2 seconds.

5. (2 points) Let $\vec{r}(t) = (t^2 - t)\,\hat{\imath} + \dfrac{1}{6}(4t - 1)^{3/2}\,\hat{\jmath} + 5\,\hat{k}$. Starting from $t = 1$, compute the arc-length parameter s.