

# Math 3113 - Multivariable Calculus

Homework #5 - 2006.03.07

Due Date - 2006.03.10

Name: \_\_\_\_\_

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1. Determine the arc length function  $s(t)$  for the function  $\vec{r}(t) = \langle 2t, 3 \sin(2t), 3 \cos(2t) \rangle$  starting at time  $t = 0$ .

2. Reparameterize the function  $\vec{r}(t)$  in terms of the arc length function.

3. Where on the curve  $\vec{r}(t)$  are we after traveling for a distance of  $\frac{\sqrt{10}}{3}\pi$ ?

4. Find the equation of the unit tangent vector to the curve  $\vec{r}(t)$  at  $t = \pi$ .

5. Write down the equation for a space curve  $\vec{R}(t)$  such that the curve intersects itself at some point in space (at different times obviously) with different tangent vectors.

6. Write down the unit tangent vectors for  $\vec{R}(t)$  at the times in question above at the point of intersection.