

**Quiz #03 – MATH 2421**  
Spring 2008

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

Directions: No books, notes, or calculators. Show algebra. Be sure to highlight your final answer!

1. [3 *pt.*] Of course, it's a perfect square... Suppose we have the position function:

$$\mathbf{r}(t) = \left\langle \frac{t^3}{3}, \frac{\sqrt{2}}{2}t^2, t \right\rangle, \quad 0 \leq t \leq 1.$$

Find the arc length of the associated parametric curve in 3D.

$$s = \int_{t_1}^{t_2} \|\mathbf{v}(t)\| dt$$

2. [3 *pts.*] If  $\mathbf{v}(t) = \langle \sec^2(t), \sqrt{t+1} \rangle$ , then find  $\mathbf{r}(t)$ , if  $\mathbf{r}(0) = \langle 2, 1 \rangle$ .

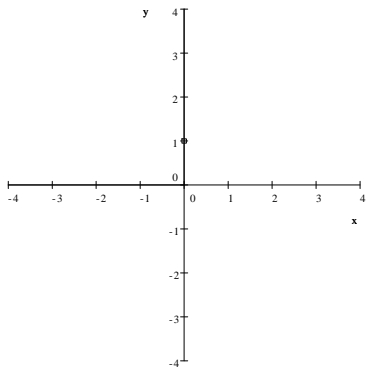
Hint: There are TWO constants of integration.

3. Consider the parametric curve associated with

$$\mathbf{r}(t) = \langle t^2 - 1, t \rangle, \quad -2 \leq t \leq 2.$$

For example, when  $t = 1$ , we are located at  $(0, 1)$ . [I have marked this point on the axes below.]

(a) [2 pts.] Sketch the rest of the graph (for  $-2 \leq t \leq 2$ ).



(b) [2 pts.] Now evaluate the velocity vector  $\mathbf{v}(1)$  and sketch it at the appropriate place on the parametric curve.

Show your component form work here!