9.6 Motion using Parametric and Vector-Valued Functions

Calculus Name: _____ **CA #2**

1. A particle moving along a curve in the xy-plane has position $(x(t), y(t))$, at time $t \geq 0$, where $\frac{dx}{dt} = 2t + 1$ and $\frac{dy}{dt} = 5$. Find the speed of the particle at time $t = 2$.

2. For time $t \geq 0$, the position of a particle moving in the xy-plane is given by the parametric equations $x(t) = 3\cos t$ and $y(t) = 2\sin t$. What is the acceleration vector of the particle at time $t = 0$?

3. For time $t \geq 0$, the position of a particle moving in the xy-plane is given by the vector $\langle \frac{1}{4}t^3 + 2,\ 2t \rangle$. What is the velocity vector of the particle at time $t = 2$.

4. **Calculator active.** The position of a particle at time $t \geq 0$ is given by $x(t) = 4t^2 - t$ and $y(t) = 2t^3 + t$. Find the total distance traveled by the particle from $t = 0$ to $t = 3$.

5. **Calculator active.** The velocity vector a particle moving in the xy-plane has components given by $\frac{dx}{dt} = \frac{\sqrt{t}}{e^t}$ and $\frac{dy}{dt} = \cos\frac{t}{2}$. At time $t = 1$, the position of the particle is $(4, 3)$. What is the y-coordinate of the position vector at time $t = 3$?

Answers to 9.6 CA #2

1. $5\sqrt{2}$	2. $\langle -3, 0 \rangle$	3. $\langle 3, 2 \rangle$	4. 66.427	5. 4.036