9.6 Motion using Parametric and Vector-Valued Functions

Calculus Name: _____ **CA #1**

1. A particle moving along a curve in the xy-plane has position $(x(t), y(t))$, at time $t \geq 0$, where $\frac{dx}{dt} = 3\cos(\pi t)$ and $\frac{dy}{dt} = 3t^2$. 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 $x(t) = t + t^2$ and $y(t) = (3t + 1)^{-1}$. What is the acceleration vector of the particle at time $t = 1$?

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

4. **Calculator active.** The position of a particle at time $t \geq 0$ is given by $x(t) = \frac{\sqrt{t+1}}{3}$ and $y(t) = t^2 + 1$. Find the total distance traveled by the particle from $t = 0$ to $t = 2$.

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

Answers to 9.6 CA #1

1. $\sqrt{153}$	2. $\langle 2, \frac{9}{32} \rangle$	3. $\langle -\frac{4}{27}, e^3 \rangle$	4. 4.023	5. 2.193