9.5 Integrating Vector-Valued Functions

Calculus Name: _____ **CA #1**

For problems 1-2, find the vector-valued function $f(t)$ that satisfies the given initial conditions.

1. $f(0) = \langle 1,\ 4\rangle$ and $f'(t) = \langle -4\cos 2t\ , -3\sin 3t\rangle$.

2. $f'(0) = \langle 4, 3\rangle$, $f(0) = \langle 2, 0\rangle$ and $f''(t) = \langle 8e^{2t}, 3e^{t}\rangle$.

3. The instantaneous rate of change of the vector-valued function $f(t)$ is given by $f'(t) = \langle 4t,\ 5\rangle$. If $f(1) = \langle 9, 7\rangle$ what is $f(2)$?

4. The position of a particle moving in the xy-plane is given by the parametric functions $x(t)$ and $y(t)$, where $\frac{dx}{dt} = 4\sin\frac{t}{2}$ and $\frac{dy}{dt} = 2\cos t$. The position of the particle is $(-2, 5)$ at time $t = 0$. What is the particle's position vector $\langle x(t), y(t)\rangle$?

5. **Calculator active.** At time $t \geq 0$, a particle moving in the xy-plane has a velocity vector given by $v(t) = \langle 2, 2^{-t^2}\rangle$. If the particle is at point $\left(1, \frac{1}{2}\right)$ at time $t = 0$, how far is the particle from the origin at time $t = 1$?

Answers to 9.5 CA #1

1. $\langle -2\sin 2t + 1, \cos 3t + 3\rangle$	2. $\langle 2e^{2t},\ 3e^{t} - 3\rangle$	3. $\langle 15, 12\rangle$	4. $\langle -8\cos\frac{t}{2} + 6, 2\sin t + 5\rangle$	5. 3.274