9.5 Integrating Vector-Valued Functions

Calculus Name: _____ **CA #2**

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

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

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

3. The instantaneous rate of change of the vector-valued function $f(t)$ is given by $f'(t) = \langle 6t, 4\rangle$. If $f(0) = \langle 2, 3\rangle$ 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 $\frac{dx}{dt} = \cos 3t$ and $\frac{dy}{dt} = \sin 2t$. The position of the particle is $(4,5)$ 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 $v(t) = \langle 1, 2^{-t^2}\rangle$. If the particle is at point $(4,\ 5)$ at time $t = 0$, how far is the particle from the origin at time $t = 1$?

Answers to 9.5 CA #2

1. $\langle e^{2t} + 1, 3e^{t} - 3\rangle$	2. $\langle -4\cos t + 8, -3\sin t + 6t\rangle$	3. $\langle 14, 11\rangle$	4. $\langle \frac{1}{3}\sin 3t + 4, -\frac{1}{2}\cos 2t + \frac{11}{2}\rangle$	5. 7.665