9.2 Second Derivatives of Parametric Equations

Calculus Name: _____ **CA #1**

1. Given a curve defined by the parametric equations $x(t) = \sqrt{t}$ and $y(t) = 2t - 1$. Determine the open t-intervals on which the curve is concave up or down.

2. If $x(t) = 6t^2$ and $y(t) = t^3 - t$, what is $\frac{d^2y}{dx^2}$ in terms of t?

3. If $x(t) = t^2 - 5$ and $y(t) = t^{-1}$, find the slope and the concavity at the point $(-4,1)$.

4. If $x = \sin\theta$ and $y = 2\cos\theta$, what is $\frac{d^2y}{dx^2}$ in terms of θ?

5. If $\frac{dx}{dt} = 4$ and $\frac{dy}{dt} = \sin(3t)$, what is $\frac{d^2y}{dx^2}$ in terms of t?

Answers to 9.2 CA #1

1. $\frac{d^2y}{dx^2} = 4$, therefore the graph is concave up on its domain $t \geq 0$.	2. $\frac{d^2y}{dx^2} = \frac{3t^2+1}{144t^3}$	3. Slope: $-\frac{1}{2}$, Concave Up	4. $-2\sec^3\theta$	5. $\frac{3\cos(3t)}{16}$