9.7 Differentiating in Polar Form

Calculus Name: _____ **CA #1**

1. Find the slope of the tangent line to the polar curve $r = 2 + 4\sin\theta$ at $\theta = \pi$.

2. A particle moves along the polar curve $r = 4 - 2\cos\theta$ so that $\frac{d\theta}{dt} = 4$. Find the value of $\frac{dr}{dt}$ at $\theta = \frac{\pi}{3}$.

3. For $0 \leq \theta \leq 2\pi$, find the values of θ for which the polar curve $r = 3\sin\theta$ **<u>might</u>** have a vertical tangent line. Then use a graphing utility to eliminate any of your possible answers.

4. A polar curve is given by the equation $r = 2\csc\theta + 3$ for $\theta \geq 0$. What is the instantaneous rate of change of r with respect to θ where $\theta = \frac{\pi}{4}$.

5. **Calculator active.** For a certain polar curve $r = f(\theta)$, it is known that $\frac{dx}{d\theta} = 3\cos\theta - 3\theta\sin\theta$ and $\frac{dy}{d\theta} = 3(\sin\theta + \theta\cos\theta)$. What is the value of $\frac{d^2y}{dx^2}$ at $\theta = 3$?

Answers to 9.7 CA #1

1. $-\frac{1}{2}$	2. $4\sqrt{3}$	3. $\frac{\pi}{4}, \frac{3\pi}{4}$	4. $-2\sqrt{2}$	5. -1.299