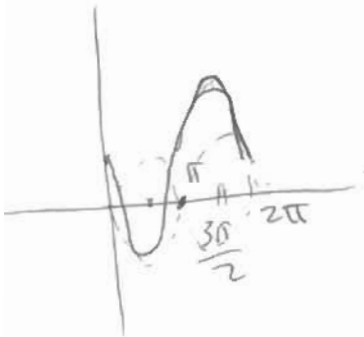
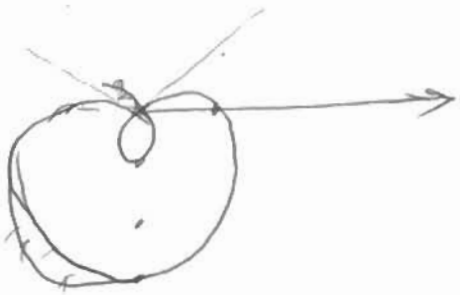
Math 201 - 1 Key Quiz # 1 B Sem 053

Name:_____ I.D.#:_____ Serial #:_____

Q1 Sketch the graph of the polar curve $r = 1 - 2\sin\theta$

$r = 0 \Rightarrow \sin\theta = \frac{1}{2} \Rightarrow \theta = \frac{\pi}{6}, \frac{5\pi}{6}$





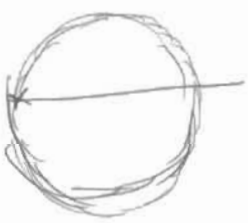
Q2 Find the equation of the tangent line to the curve $x = 2t - 1$, $y = t^2 + 2t + 1$ at $t = 2$

$x' = 2$, $y' = 2t + 2$, $\frac{dy}{dx} = \frac{2t+2}{2} = t + 1 \Big|_{t=2} = 3$

$x = 3, y = 9$

$y - 9 = 3(x - 3) = 3x - 9$

$y = 3x$



Q3 Find all points at which the polar curve $r = 3\cos\theta$ has a vertical tangent.

$\frac{dr}{d\theta} = -3\sin\theta$, Vertical tangent if $\frac{dx}{d\theta} = 0$ and $\frac{dy}{d\theta} \neq 0$

$x = r\cos\theta = 3\cos^2\theta$, $\frac{dx}{d\theta} = -6\cos\theta\sin\theta$

$\frac{dx}{d\theta} = 0 \Rightarrow -6\cos\theta\sin\theta = 0 \Rightarrow \cos\theta = 0 \Rightarrow \theta = \frac{\pi}{2}, \frac{3\pi}{2}$

$\sin\theta = 0 \Rightarrow \theta = 0, \pi, 2\pi$

$y = r\sin\theta = 3\sin\theta\cos\theta \Rightarrow \frac{dy}{d\theta} = 3\cos^2\theta - 3\sin^2\theta$

$\frac{dy}{d\theta}\Big|_{\theta=0} \neq 0$, $\frac{dy}{d\theta}\Big|_{\theta=\pi} \neq 0$, $\frac{dy}{d\theta}\Big|_{\theta=\frac{\pi}{2}} \neq 0$, $\frac{dy}{d\theta}\Big|_{\theta=\frac{3\pi}{2}} \neq 0$

The points are $P(3,0)$, $P_2(0,\frac{\pi}{2})$ since $(-3,\pi) = (3,0) \neq (0,\frac{\pi}{2}) = (0,\frac{3\pi}{2})$