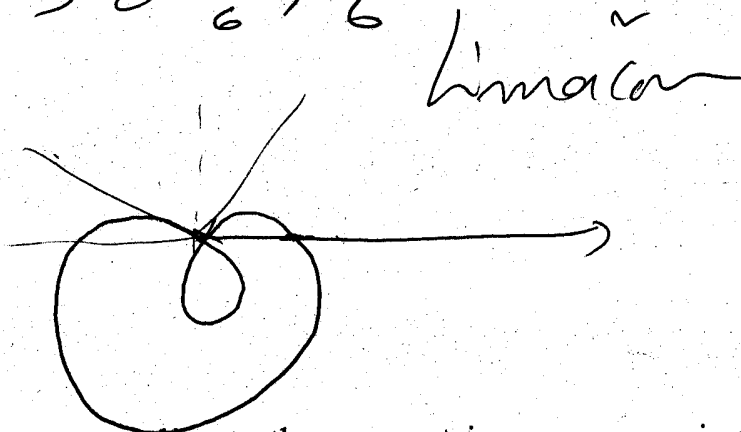
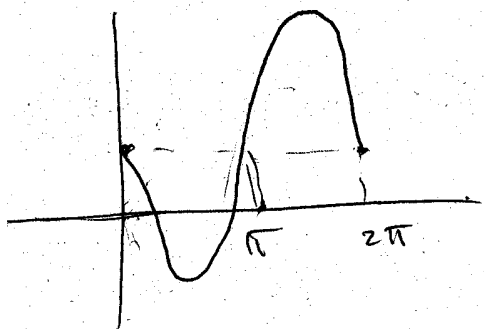


Name: Key ID.# _____ Serial # _____

Q1: Sketch the graph of the polar curve $r = 1 - 2 \sin \theta$, show the angles where the graph passes through the pole.

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



Q2: Find the slope of the tangent line to the parametric curve $x = \sin t$,

$$y = \cos t \text{ at } t = \frac{\pi}{3}$$

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{-\sin t}{\cos t} \Big|_{\frac{\pi}{3}} = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$$

Q3: Find the angles where the graph $r = \cos \theta$, $0 \leq \theta \leq \pi$ has vertical tangent.

$$y = r \sin \theta = \cos \theta \sin \theta$$

$$x = r \cos \theta = \cos^2 \theta$$

$$\frac{dy}{d\theta} = \cos^2 \theta - \sin^2 \theta$$

$$\frac{dx}{d\theta} = -2 \sin \theta \cos \theta$$

Vertical tangent if $\frac{dx}{d\theta} = 0$ and $\frac{dy}{d\theta} \neq 0$

So the angles are $\theta = 0$ or $\theta = \pi$

