

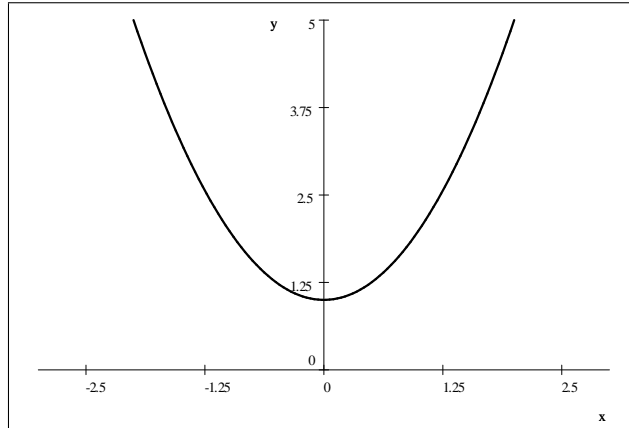
# Solution of Math 201 Quiz 1

(B)

Name:.....Serial#:.....Sec #:.....

**Q.1:** Eliminate the parameter  $t$  from the parametric equations  $x = \cot(t)$ ,  $y = \csc^2(t)$  to find a cartesian equation and sketch its graph.

**Sol:** using  $1 + \tan^2(t) = \sec^2(t)$ , we get  $1 + x^2 = 1 + \cot^2(t) = \csc^2(t) = y$ .  
Graph of  $y = x^2 + 1$  is a parabola.



**Q.2:** Find  $\frac{dy}{dx}$  for the parametric equations given in Question 1. Also find equation of the tangent line to the curve at  $t = \frac{\pi}{4}$ .

**Sol:**  $\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{-2 \csc(t) \cdot \csc(t) \cot(t)}{-\csc^2(t)} = 2 \cot(t)$ , and slope at  $t = \frac{\pi}{4}$  is  $m = 2 \cot(\frac{\pi}{4}) = 2$ . At  $t = \frac{\pi}{4}$ ,

$x = \cot(\frac{\pi}{4}) = 1$  and  $y = \csc^2(\frac{\pi}{4}) = 2$ .

The equation of tangent at  $t = \frac{\pi}{4}$  is  $(y - 2) = 2(x - 1)$ .

**Q.3:** Sketch the graph of the polar equation  $r = 1 + \cos(\theta)$ .

$\theta$	$r$
0	2
$\frac{\pi}{3}$	$\frac{3}{2}$
$\frac{\pi}{2}$	1
$\frac{2\pi}{3}$	$\frac{1}{2}$
$\pi$	0
$\frac{4\pi}{3}$	$\frac{1}{2}$
$\frac{3\pi}{2}$	1
$\frac{5\pi}{3}$	$\frac{3}{2}$
$2\pi$	2

