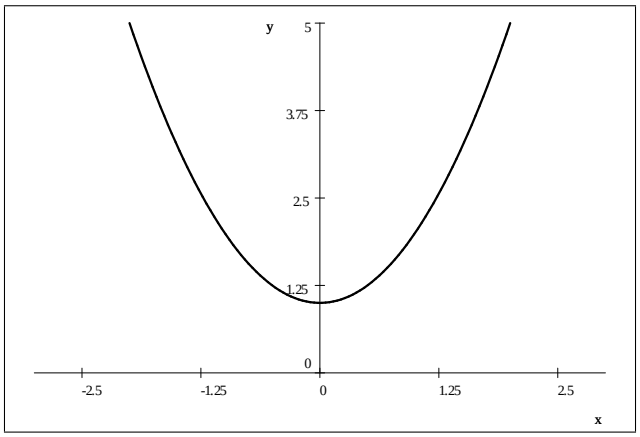
Solution of Math 201 Quiz 1 (A)

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

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

Sol: using $1 + \tan^2(t) = \sec^2(t)$, we get $1 + x^2 = 1 + \tan^2(t) = \sec^2(t) = y$.

Graph of $y = x^2 + 1$ is a parabola.

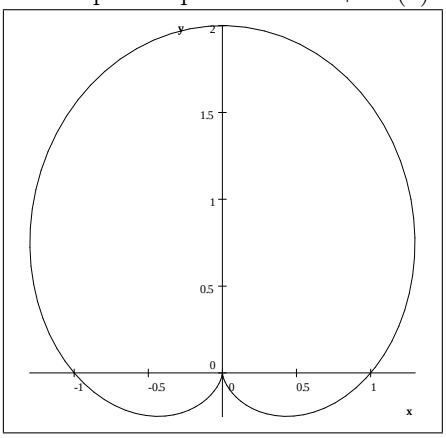


Q.2: Find $\dfrac{dy}{dx}$ for the parametric equations given in Question 1. Also find equation of the tangent line to the curve at $t = \dfrac{\pi}{4}$.

Sol: $\dfrac{dy}{dx} = \dfrac{\dfrac{dy}{dt}}{\dfrac{dx}{dt}} = \dfrac{2\sec(t).\sec(t)\tan(t)}{\sec^2(t)} = 2\tan(t)$, and slope at $t = \dfrac{\pi}{4}$ is $m = 2\tan(\dfrac{\pi}{4}) = 2$. At $t = \dfrac{\pi}{4}$, $x = \tan(\dfrac{\pi}{4}) = 1$ and $y = \sec^2(\dfrac{\pi}{4}) = 2$.

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

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



θ	r
0	1
$\dfrac{\pi}{6}$	$\dfrac{3}{2}$
$\dfrac{\pi}{2}$	2
$\dfrac{5\pi}{6}$	$\dfrac{3}{2}$
π	1
$\dfrac{7\pi}{6}$	$\dfrac{1}{2}$
$\dfrac{3\pi}{2}$	0
$\dfrac{11\pi}{6}$	$\dfrac{1}{2}$
2π	1