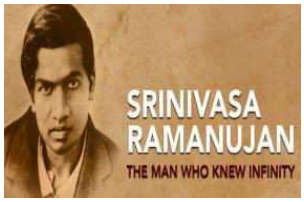
SRM Institute of Science and Technology
Kattankulathur

DEPARTMENT OF MATHEMATICS

18MAB101T Calculus and Linear Algebra

UNIT - IV



Tutorial Sheet -1

		Answers
1.	Find the radius of the curve $y = e^x$ at (0, 1)	$\rho = 2\sqrt{2}$
2.	Find the radius of curvature at the point $\left(\frac{1}{4}, \frac{1}{4}\right)$ on the curve $\sqrt{x} + \sqrt{y} = 1$.	$\rho = 1/\sqrt{2}$
3.	Show that the radius of curvature at any point of the catenary $y = c\cosh(x/c)$ is y^2/c. Also find ρ at (0, c).	$\rho = C$
4.	Find the radius of curvature at the point (c, c) on the curve $xy = c^2$	$\rho = c\sqrt{2}$
5.	Find ρ at any point $P(at^2, 2at)$ on the parabola $y^2 = 4ax$.	$\rho = 2a(1+t^2)^{3/2}$
6.	Find the radius of curvature at any point $x = a\cos^3\theta, y = a\sin^3\theta$ of the curve $x^{2/3} + y^{2/3} = a^{2/3}$. Also show that $\rho^3 = 27axy$.	$\rho = 3a\sin 2\theta/2$
7.	Show that the radius of curvature at any point of the curve $x = ae^{\theta}(\sin\theta - \cos\theta)$, $y = ae^{\theta}(\sin\theta + \cos\theta)$ is twice the perpendicular distance of the tangent at the point from the origin.	
8.	Prove that the radius of curvature at any point of the cycloid $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$ is $4a\cos\frac{\theta}{2}$.	
9.	Show that the line joining any point θ on $x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$ to its centre of curvature is bisected by the line y = 2a.	
10.	Find the circle of curvature of the curvature $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at the point $\left(\frac{a}{4}, \frac{a}{4}\right)$.	$(x - \frac{3a}{4})^2 + (y - \frac{3a}{4})^2 = \frac{a^2}{2}$