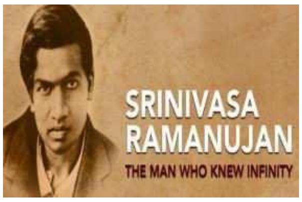
	SRM Institute of Science and Technology Kattankulathur DEPARTMENT OF MATHEMATICS 18MAB101T Calculus and Linear Algebra UNIT - IV	
	Tutorial Sheet -2	Answers

1.	State two properties of the evolute of the curve.	
2.	Find the envelope of the family of straight lines $y = mx + am^2$, m being the parameter	Ans: $x^2 + 4ay = 0$
3.	Define envelope of a family of curves.	
4.	Find the envelope of the family of straight lines $x\cos\alpha + y\sin\alpha = a\sec\alpha, \alpha$ being the parameters.	$\boldsymbol{Ans}: y^2 - 4a(a - x) = 0$
5.	Define involutes and evolutes.	
6.	Find the equation of the circle of curvature at (c, c) on $xy = c^2$.	$\boldsymbol{Ans}: (x - 2c)^2 + (y - 2c)^2 = (\sqrt{2}c)^2$
7.	Find the equation of the evolute of the a) parabola $y^2 = 4ax$; b) ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$; c) hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$; d) rectangular hyperbola $xy = c^2$ and e) curve $x^{2/3} + y^{2/3} = a^{2/3}$.	Ans: a) $27ay^2 = 4(x - 2a)^3$ b) $(ax)^{\frac{2}{3}} + (by)^{\frac{2}{3}} = (a^2 - b^2)^{\frac{2}{3}}$ c) $(ax)^{\frac{2}{3}} - (by)^{\frac{2}{3}} = (a^2 + b^2)^{\frac{2}{3}}$ d) $(x + y)^{\frac{2}{3}} - (x - y)^{\frac{2}{3}} = (4c)^{\frac{2}{3}}$ e) $(x + y)^{\frac{2}{3}} + (x - y)^{\frac{2}{3}} = 2a^{\frac{2}{3}}$
8.	Show that the evolute of the cycloid $x = a(\theta - \sin\theta), y = a(1 - \cos\theta)$ is another equal cycloid.	
9.	Find the evolute of the tractrix $x = a\left(\cos t + \log\tan\left(\frac{t}{2}\right)\right), y = a\sin t$.	Ans: $y = a\cosh\frac{x}{a}$
10.	Show that the evolute of the curve $x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$ is a circle.	