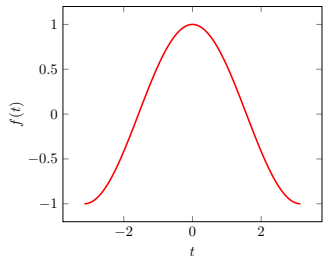
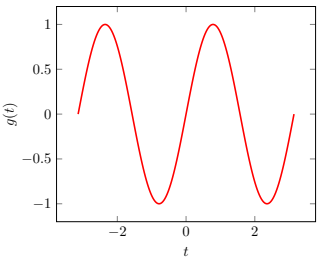
Math 242 - Homework 0 **Due Friday, August 29**

For each of the problems below, (a) sketch the curves given by the parametric equations and indicate with an arrow the direction in which the curve is traced as the curve increases, and (b) find an explicit formula for the graph as a function of x.

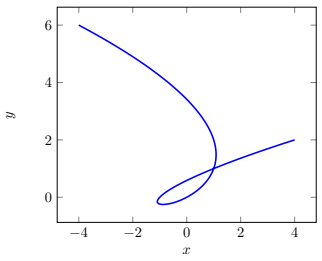
1. $x = 3t - 5, \quad y = 2t + 1$
2. $x = \sqrt{t}, \quad y = 1 - t$
3. $x = 3\cos\theta, \quad y = 2\sin\theta, \quad 0 \le \theta \le \pi$
4. Match the graphs of the parametric equations $x = f(t)$ and $y = g(t)$ in (a)-(c) with the parametric curves labelled I-III.

(a)

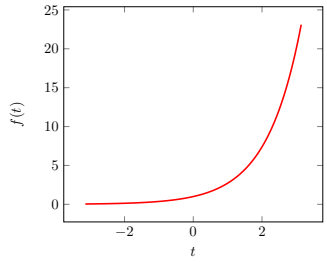


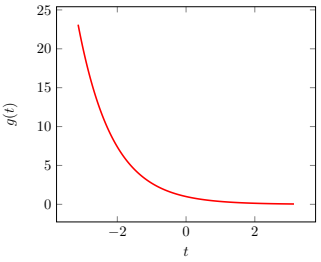


I.

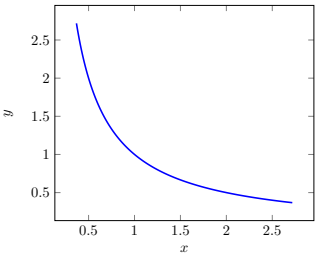


(b)

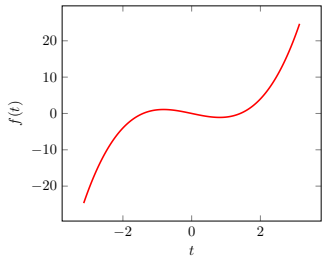


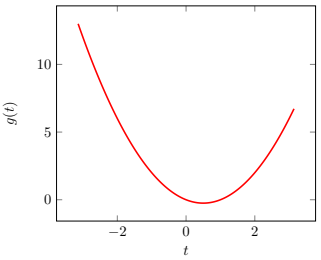


II.

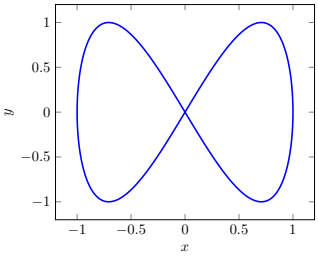


(c)





III.



5. Find parametric equations $x = f(t)$ and $y = g(t)$ which describe a parametric curve that spirals outward as it winds clockwise around the origin. Your spiral should wind at least 3 times around the origin while $0 \le t \le 2\pi$.
6. Show that the curve $x = \cos(t)$, $y = \sin(2t)$ has two tangent lines at (0,0) and find their equations. Sketch the curve.
7. Find dy/dx and d^2y/dx^2 for $x = 4 + t^2$, $y = t^2 + t^3$. For which values of t is the curve concave upward?
8. For the curve $x = t - 2\sin(t)$, $y = 2 + \sin(t)$, $0 \le t \le 2\pi$, find the area of the region bounded by the curve, the x-axis, and the lines $x = 0$ and $x = 2\pi$.