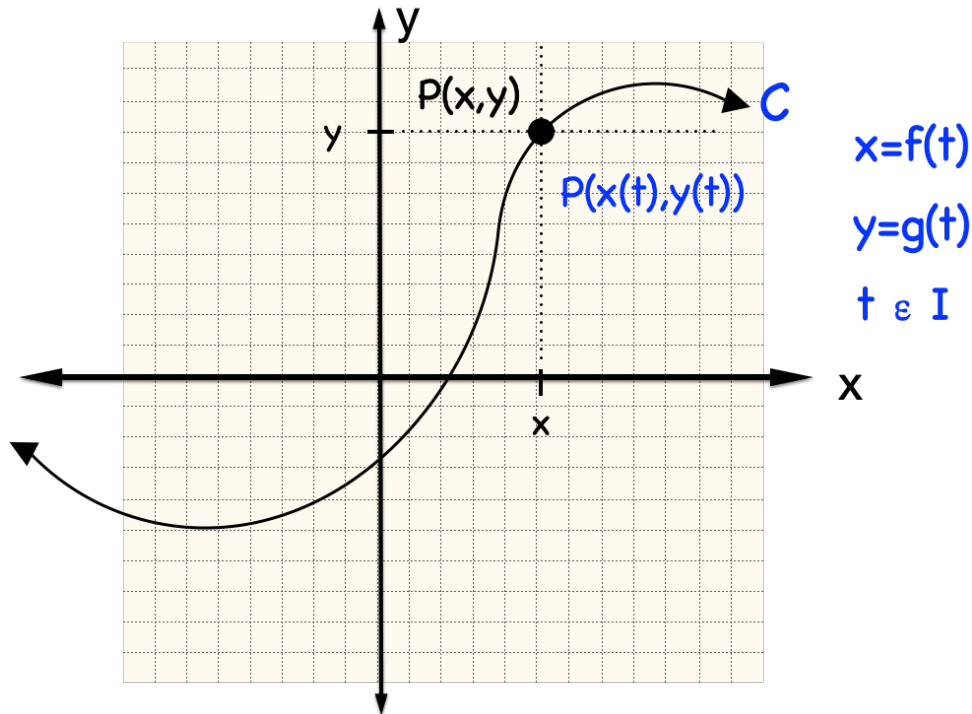


Parametric Equations

We will be considering the curves of functions that can be described using an additional variable t that in the Cartesian Coordinate System (Rectangular). This will allow our points $P(xy)$ in the Cartesian Coordinate System to be describes by an equation for each variable x and y . That is, $x = f(t)$ and $y = g(t)$ for all t in an interval. We will refer to curves represented by these points P with a capital letter C .



We will have various types of intervals for our parameter t and will need some definitions to consider when working with these curves and intervals.

Let $a \leq t \leq b$

Def-Initial Point

We say a curve C has in initial point at $(f(a), g(a))$.

Def-Terminal Point

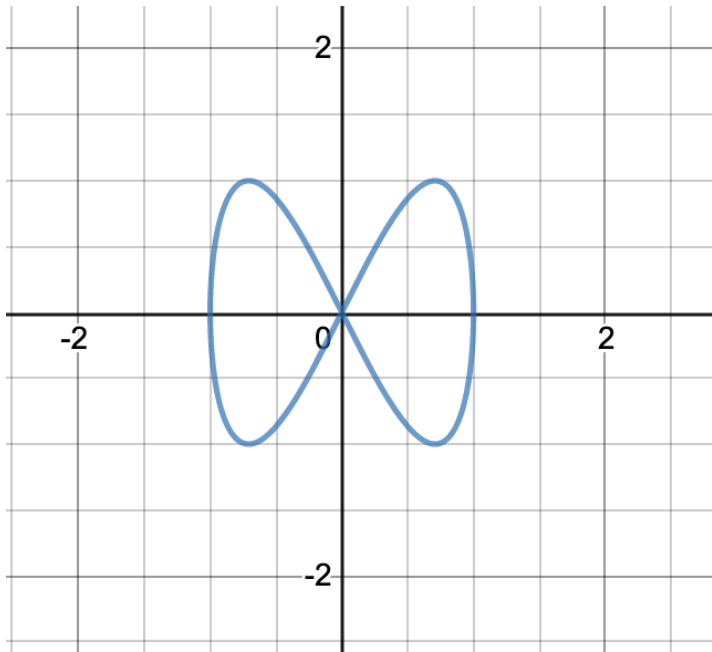
We say a curve C has in terminal point at $(f(b), g(b))$.

Def Orientation

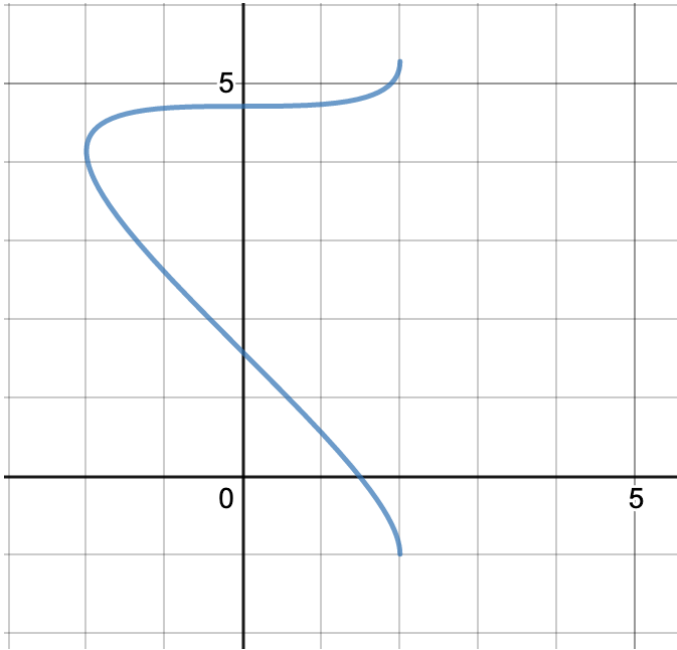
The direction a point P travels on a curve as t increases.

Interesting Parametric Curves
(Some you may recognize)

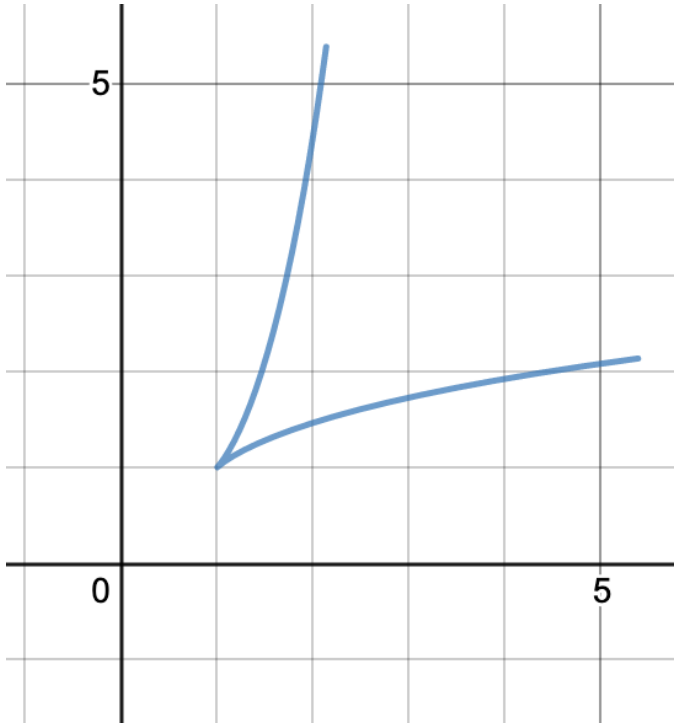
$$x = \cos(t)$$
$$y = \sin(2t)$$



$$\begin{aligned}x &= 2\cos(t) \\y &= t - \cos(t) \\0 &\leq t \leq 2\pi\end{aligned}$$



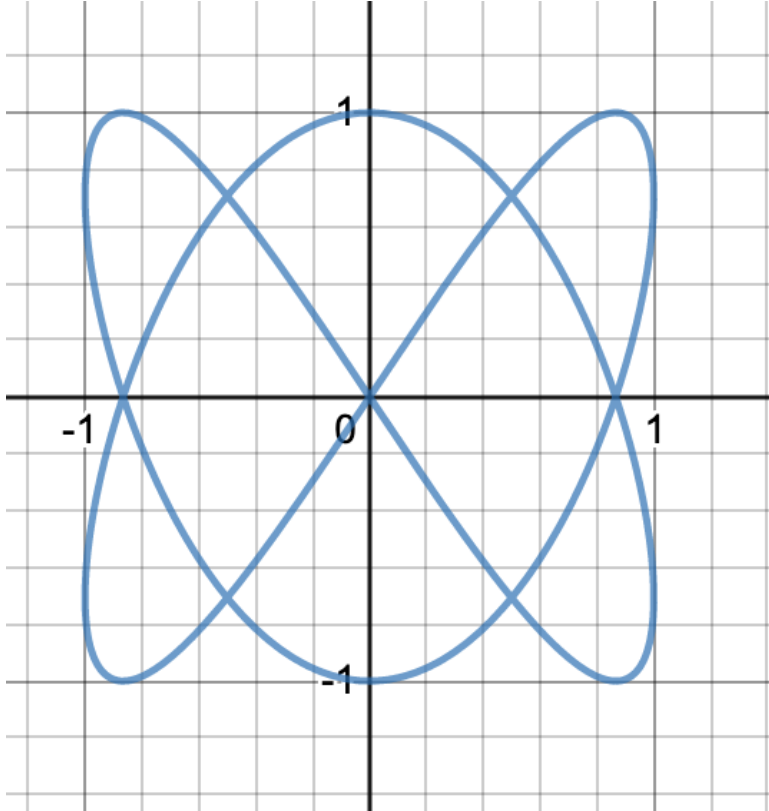
$$\begin{aligned}x &= e^{-t} + t \\y &= e^t + t \\-2 &\leq t \leq 2\end{aligned}$$



$$\begin{aligned}x &= t + \sin(2t) \\y &= t + \sin(3t) \\-10 &\leq t \leq 10\end{aligned}$$

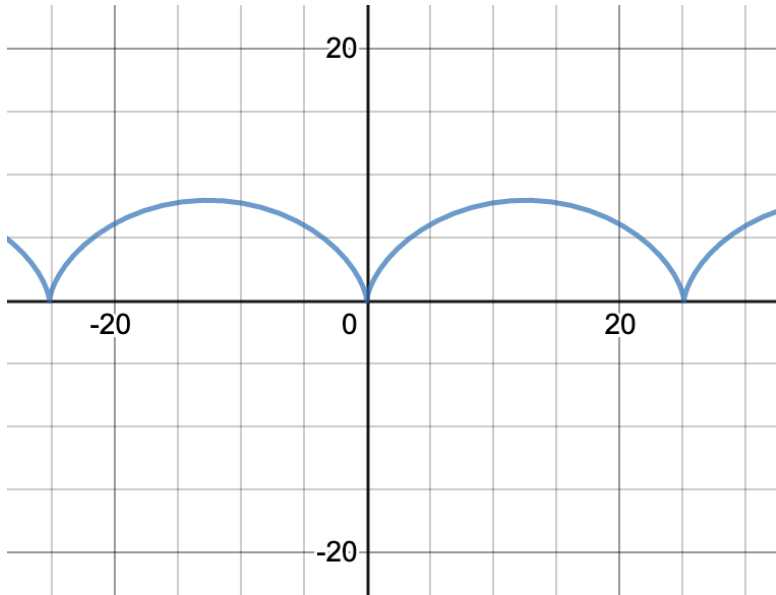


$$\begin{aligned}x &= \sin(2t) \\y &= \sin(3t) \\-6 &\leq t \leq 6\end{aligned}$$

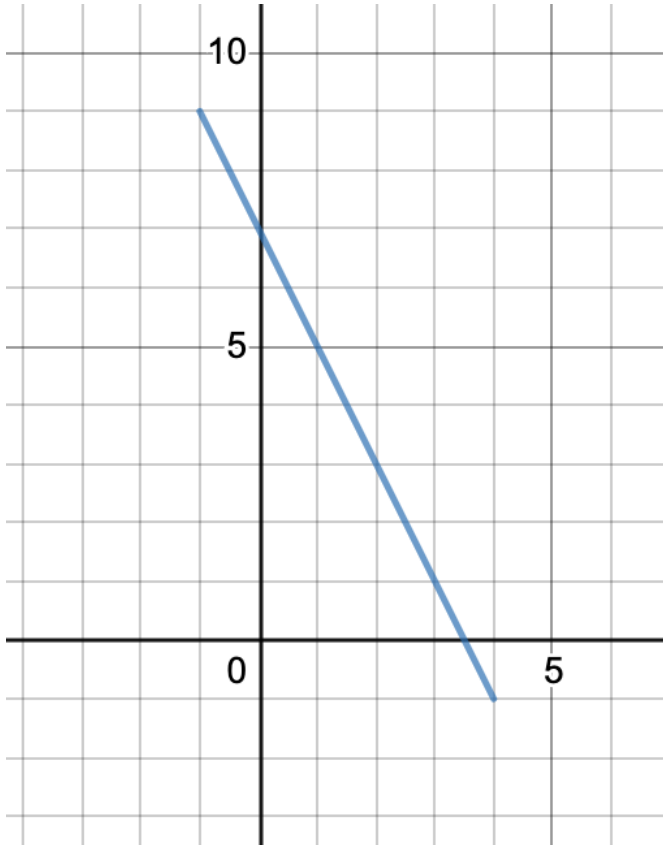


$$x = 4(t - \sin(t))$$

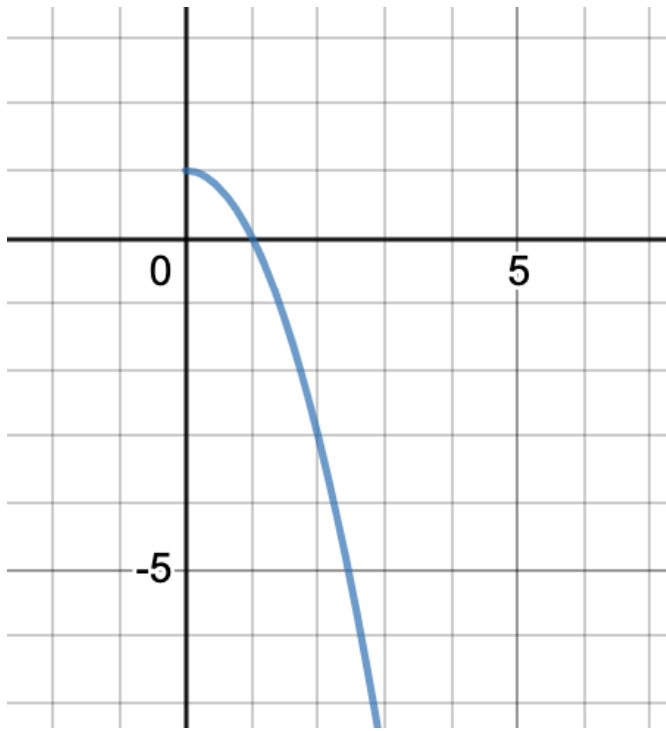
$$y = 4(1 - \cos(t))$$



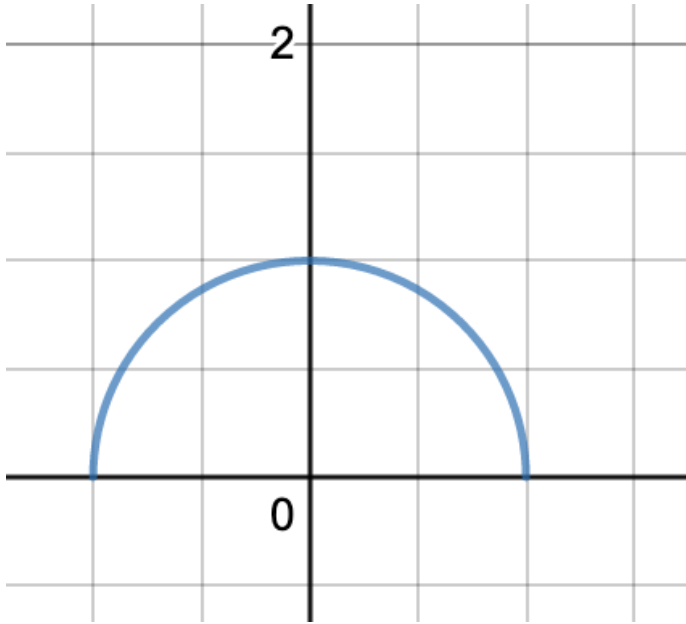
$$\begin{aligned}x &= 1 + t \\y &= 5 - 2t \\-2 &\leq t \leq 3\end{aligned}$$



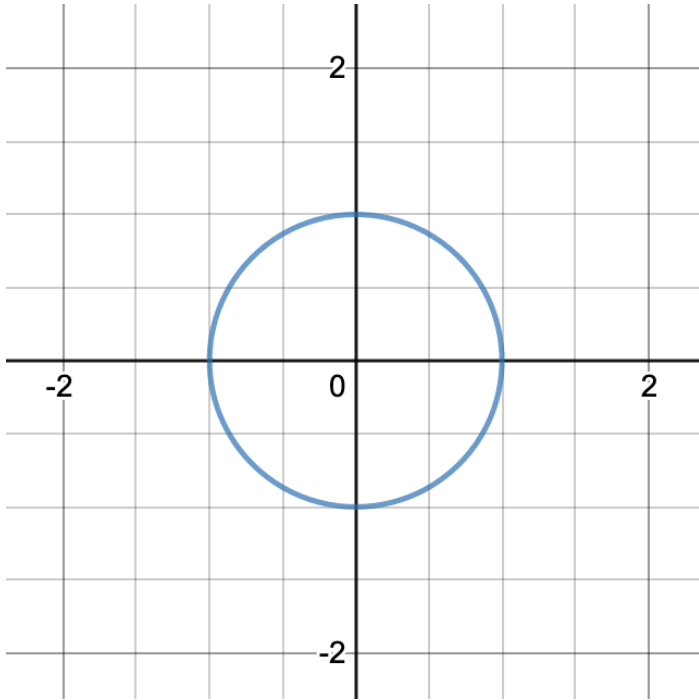
$$x = \sqrt{t}$$
$$y = 1 - t$$



$$\begin{aligned}x &= \sin(t) \\y &= \cos(t) \\0 &\leq t \leq \pi\end{aligned}$$

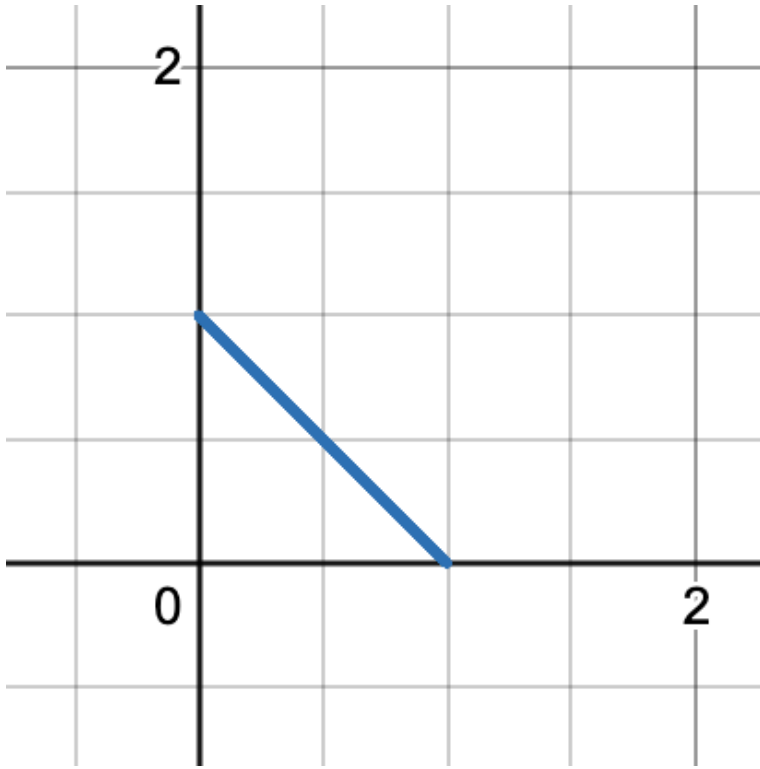


$$\begin{aligned}x &= \sin(t) \\y &= \cos(t) \\0 &\leq t \leq 2\pi\end{aligned}$$



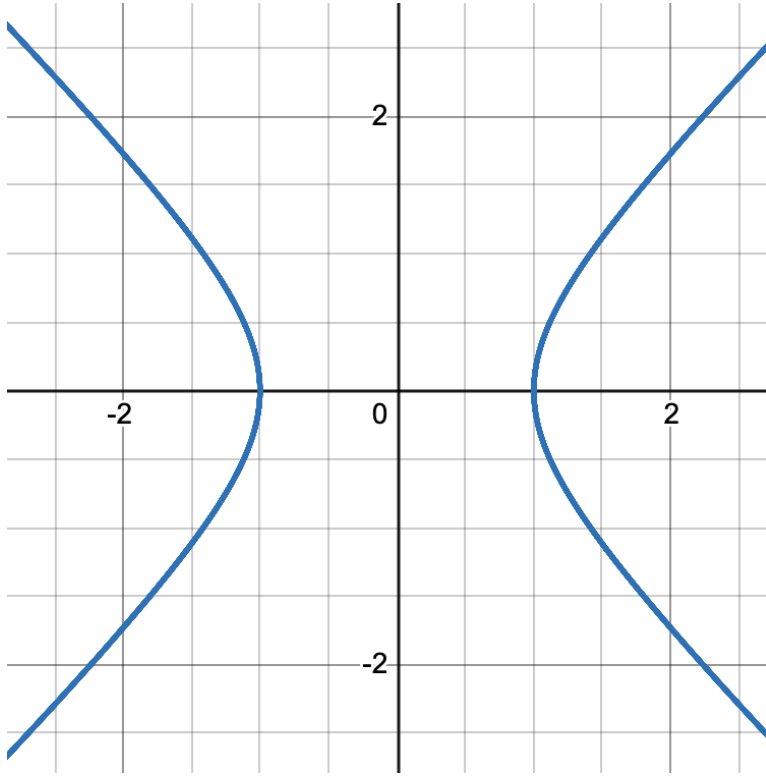
$$x = \sin^2(t)$$

$$y = \cos^2(t)$$



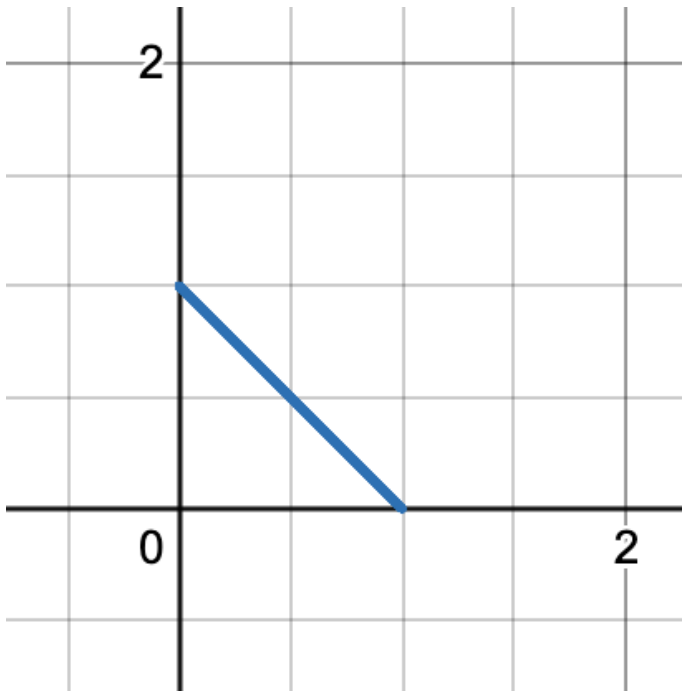
$$x = \sec(t)$$

$$y = \tan(t)$$



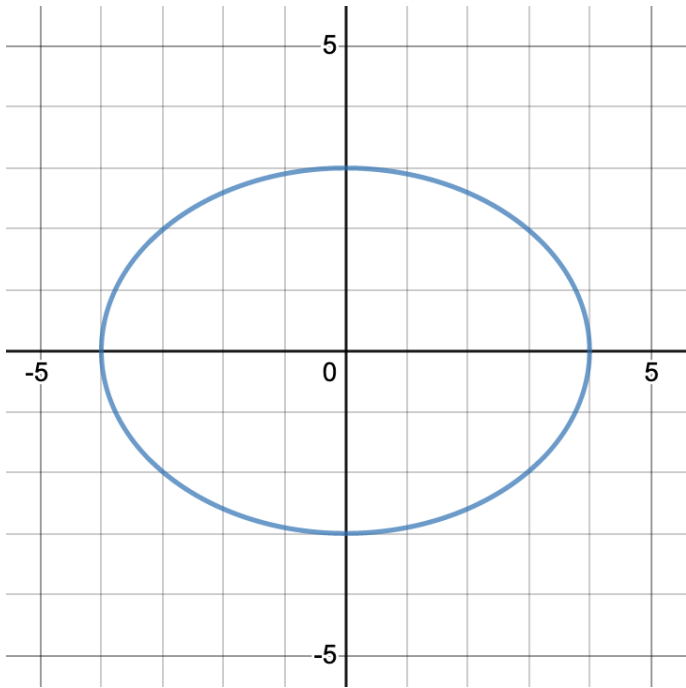
$$x = \sin^2(t)$$

$$y = \cos^2(t)$$

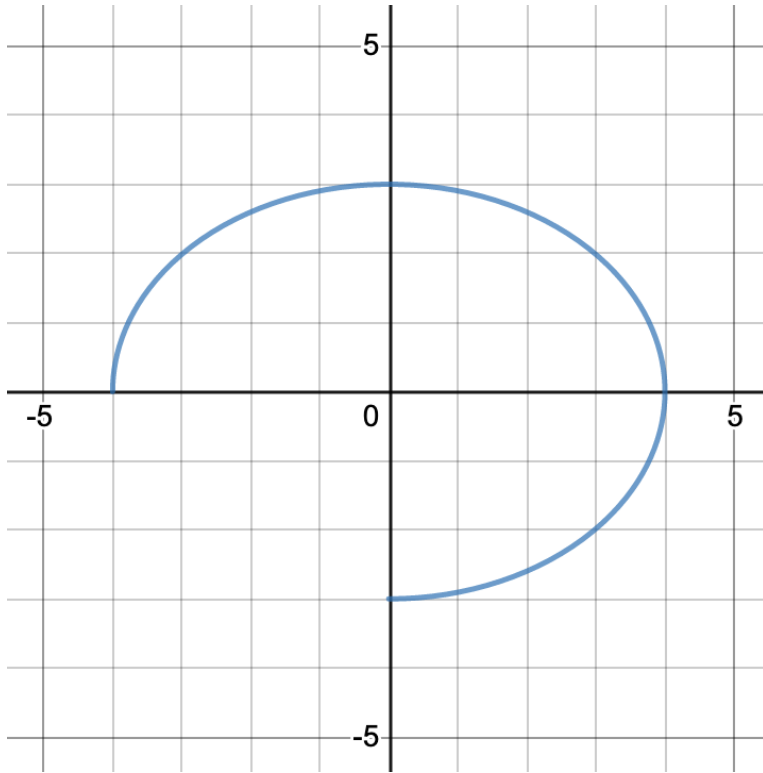


$$x = 4\cos(t)$$

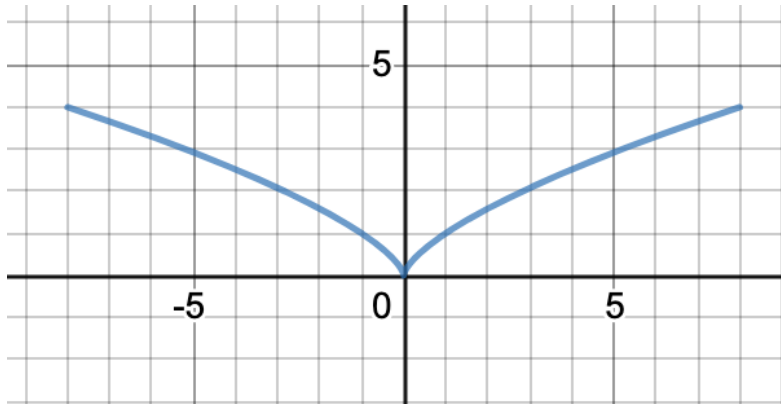
$$y = 3\sin(t)$$



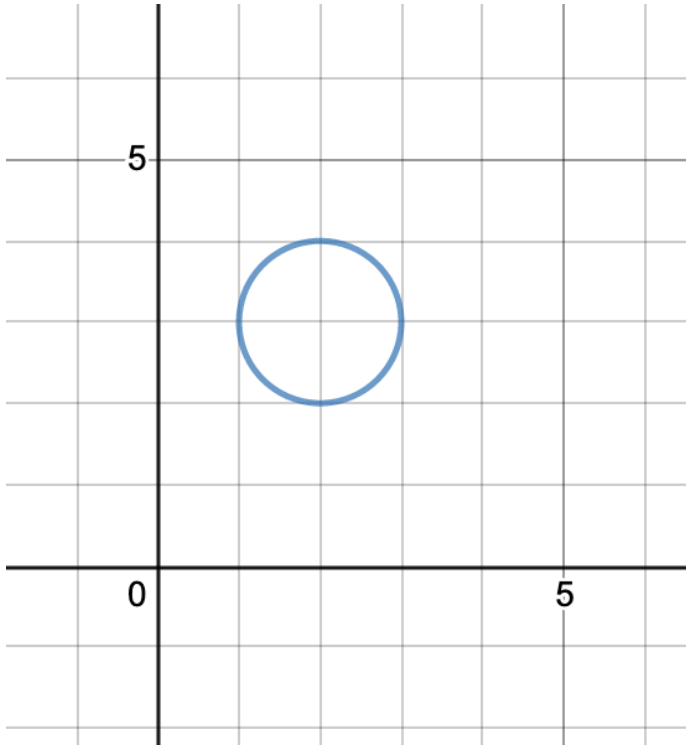
$$\begin{aligned}x &= 4\cos(t) \\y &= 3\sin(t) \\-\frac{\pi}{2} &\leq t \leq \pi\end{aligned}$$



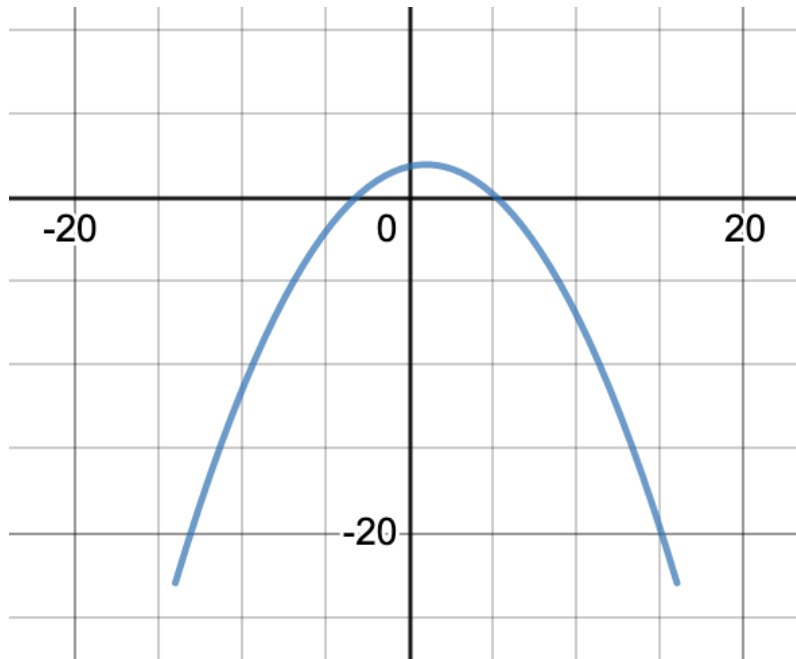
$$\begin{aligned}x &= t^3 \\y &= t^2 \\-2 \leq t &\leq 2\end{aligned}$$



$$\begin{aligned}x &= 2 + \cos(t) \\y &= 3 + \sin(t) \\0 &\leq t \leq 2\pi\end{aligned}$$



$$\begin{aligned}x &= 1 + 3t \\y &= 2 - t^2 \\-5 &\leq t \leq 5\end{aligned}$$



$$\begin{aligned}x &= \cos^2(t) \\y &= \cos(t) \\0 &\leq t \leq 4\pi\end{aligned}$$

