Math 1060 ~ Trigonometry

24 Curves Described by Parametric Equations

Curves Described by Parametric Equations

The functions describing the curve, C, traditionally use $f(t)$ to represent x and $g(t)$ to represent y. The independent variable t in this case is called a parameter.

The system of equations $\begin{cases} x = f(t) \\ y = g(t) \end{cases}$

is called a system of parametric equations. The parametrization of C endows it with an orientation and the arrows on C indicate the motion as values of t increase.

For example, this set of equations describes the unit circle, with the arrow indicating the orientation.

$$\begin{cases} x = \cos\ t\ 0 \le t \le 2\pi \\ y = \sin\ t \end{cases}$$

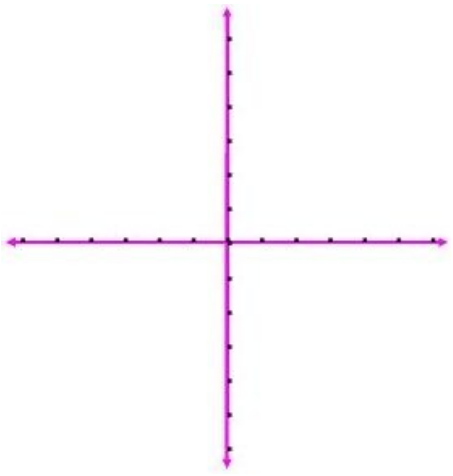
To sketch parametric equations, a chart is often useful.

EX 1

Draw a chart for this set of equations and plot several points.

$$\begin{cases} x = 2t + 1 \\ y = t^2 - 2 \end{cases} t \ge -2$$

t	$x(t) = 2t + 1$	$y(t) = t^2 - 2$	$(x(t), y(t))$



EX 2

Plot this equation by following these steps.

$$\begin{cases} x = -2t^2 \text{ on the interval } [-1,1] \\ y = t^3 \end{cases}$$

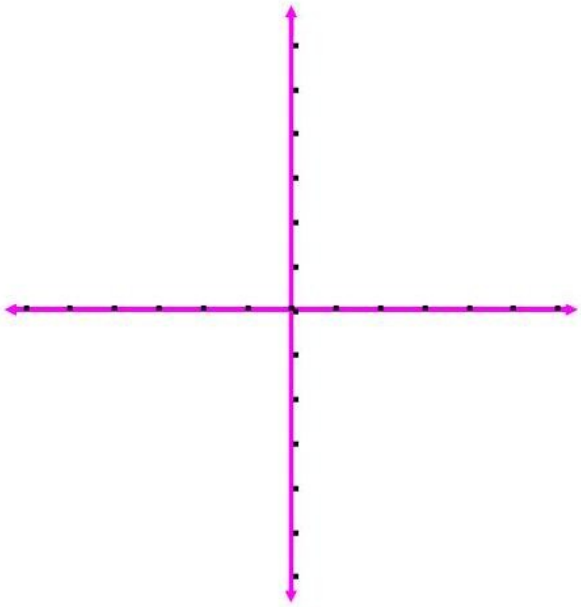
2a)

Make a table of values.

2b)

Plot the points, including orientation.

t	$x(t)$	$y(t)$	$(x(t), y(t))$



EX 3

Plot this parametric curve with orientation.

$$\begin{cases} x = 2\cos t \\ y = 1 + 3\sin t \end{cases} \quad 0 \le t \le \frac{3\pi}{2}$$

t	$x(t)$	$y(t)$	$(x(t), y(t))$