Math 280: Parametric equations
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One way to describe a curve is to define its points (*x, y*) as functions of another variable, *t*.
We call *t* a **parameter**, and

$$\begin{aligned} x &= f(t) \\ y &= g(t) \end{aligned}$$ are called **parametric equations**.

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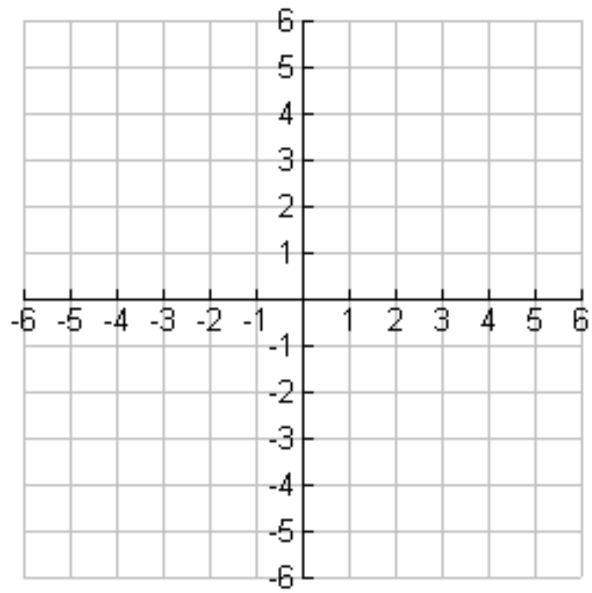
1. Graph the curve defined by the parametric equations: $\begin{aligned} x &= 5 - t^2 \\ y &= t - 2 \end{aligned}$ $\quad -3 \le t \le 3$

Indicate with arrows the direction the curve is traced as *t* increases.

t	x	y	(x,y)
-3			
-2			
-1			
0			
1			
2			
3			

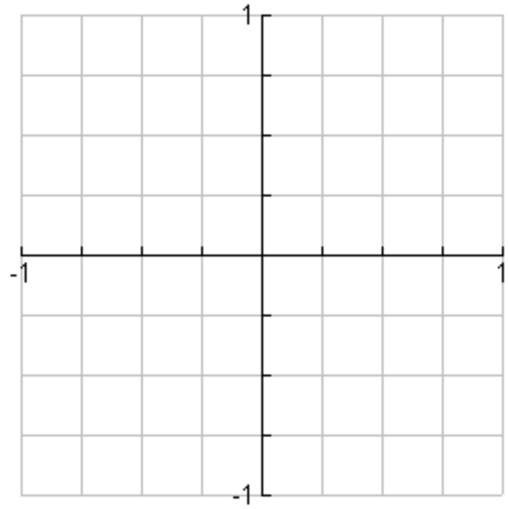


What does this curve look like?

Verify by eliminating the parameter t, and write in rectangular/Cartesian form.

2. Consider the curve defined by the parametric equations: $x = \cos t$, $y = \sin t$ $\quad 0 \le t \le 2\pi$

t	x	y
0		
$\pi/4$		
$\pi/2$		
$3\pi/4$		
π		
$5\pi/4$		
$3\pi/2$		
$7\pi/4$		
2π		



a. Graph and describe this curve. Where does it start? Which direction does it go? Draw arrows indicating the direction of the path as t varies from 0 to 2π.

b. Graph $\begin{array}{l} x = \cos t \\ y = \sin t \end{array}$ on your graphing calculator. (you'll need to be in "PAR" mode)

c. How can we trace just the top half of the curve?

d. Find parametric equations for a circle centered at the origin with radius 5.

e. Find parametric equations for a circle centered at (h, k) with radius r.

Come up with parametric equations of the following curves:

1. A vertical line through (1, 2).

2. A horizontal line through (1, 2).

3. A line with slope 2/3 through (1, 2).

4. The function $y = x^3 + 1$

5. The function $y = f(x)$