Notes 35 Name _____

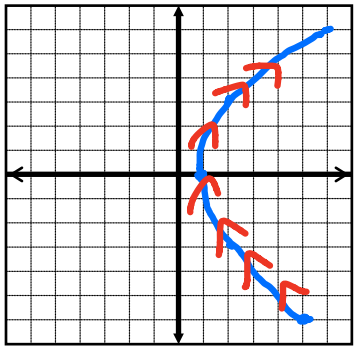
Parametric Equations (9.5)

Plane Curves and Parametric Equations	**Graphing a Plane Curve Described by Parametric Equations**
Suppose that t is a number in an interval I. A plane curve is the set of ordered pairs (x, y), where $x = f(t),\ y = g(t)$ for t in interval I. The variable t is called a parameter, and the equations $x = f(t)$ and $y = g(t)$ are called parametric equations.	1. Select values of t on the given interval. 2. For each value of t, use the given parametric equations to compute x and y. 3. Plot the points (x,y) in the order of increasing t and connect them with a smooth curve.

Graphing a Curve Defined by Parametric Equations: Graph the plane curves defined by the parametric equations.

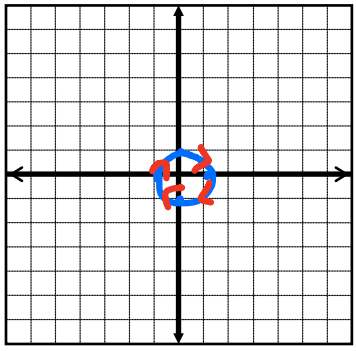
1) $x = t^2 + 1, \quad y = 3t, \quad -2 \le t \le 2$

t	x	y	(x, y)
-2	5	-6	$(5, -6)$
-1	2	-3	$(2, -3)$
0	1	0	$(1, 0)$
1	2	3	$(2, 3)$
2	5	6	$(5, 6)$



2) $x = -\sin t, \quad y = -\cos t, \quad 0 \le t < 2\pi$

t	x	y	(x, y)
0	0	-1	$(0, -1)$
$\pi/2$	-1	0	$(-1, 0)$
π	0	1	$(0, 1)$
$3\pi/2$	1	0	$(1, 0)$
2π	0	-1	$(0, -1)$



Finding and Graphing the Rectangular Equation of a Curve Defined Parametrically: Eliminate the parameter t. Then use the rectangular equation to sketch the plane curve represented by the given parametric equations. Use arrows to show the orientation of the curve corresponding to increasing values of t. (If an interval for t is not specified, assume that $-\infty < t < \infty$).

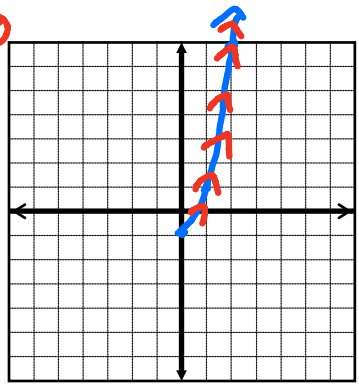
3) $x = \sqrt{t}, \quad y = 2t - 1$

$x^2 = t$ $\quad y = 2x^2 - 1$

$y + 1 = 2x^2$

$x^2 = \frac{1}{2}(y + 1)$

$t \ge 0$



t	(x, y)
0	$(0, -1)$
1	$(1, 1)$

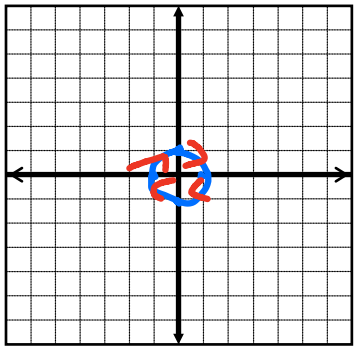
4) $x = -\sin t, \quad y = -\cos t, \quad 0 \le t < 2\pi$

$x^2 = \sin^2 t \quad y^2 = \cos^2 t$

$x^2 + y^2 = \sin^2 t + \cos^2 t$

$x^2 + y^2 = 1$ Circle

t	(x,y)
0	$(0,-1)$
$\pi/2$	$(-1,0)$



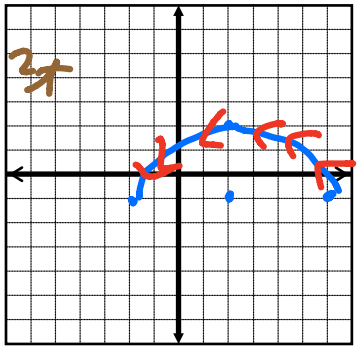
5) $x = 2 + 4\cos t, \quad y = -1 + 3\sin t, \quad 0 \le t \le \pi$

$\left(\frac{x-2}{4}\right)^2 = \cos^2 t \quad \left(\frac{y+1}{3}\right)^2 = \sin^2 t$

$\frac{(x-2)^2}{16} + \frac{(y+1)^2}{9} = \cos^2 t + \sin^2 t$

$\frac{(x-2)^2}{16} + \frac{(y+1)^2}{9} = 1$ Ellipse

t	(x,y)
0	$(6,-1)$
$\pi/2$	$(2,2)$
π	$(-2,-1)$



6) $x = t^2, \quad y = t - 2$

$x = t^2 \quad y + 2 = t$

$x = (y+2)^2$ parabola

$(y+2)^2 = x$

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