

Parametric Equations (9.5)

Plane Curves and Parametric Equations

Suppose that t is a number in an interval I . A plane curve is the set of ordered pairs (x, y) , where

$$x = f(t), \quad y = g(t) \quad \text{for } t \text{ in interval } I.$$

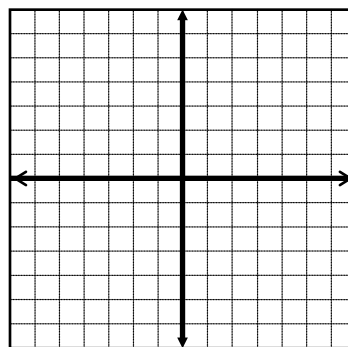
The variable t is called a parameter, and the equations $x = f(t)$ and $y = g(t)$ are called parametric equations.

Graphing a Plane Curve Described by Parametric Equations

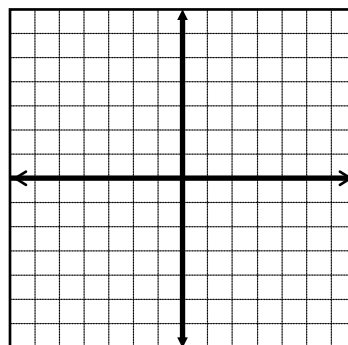
1. Select values of t on the given interval.
2. For each value of t , use the given parametric equations to compute x and y .
3. Plot the points (x, y) in the order of increasing t and connect them with a smooth curve.

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

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

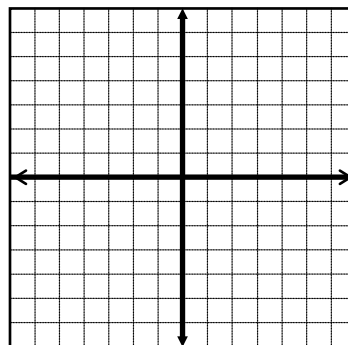


2) $x = -\sin t, \quad y = -\cos t, \quad 0 \leq t < 2\pi$

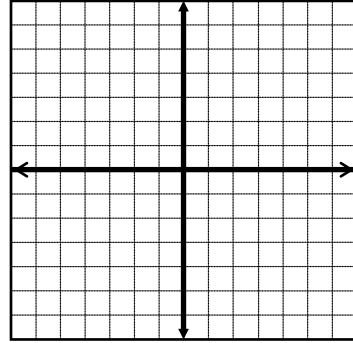


Finding and Graphing the Rectangular Equation of a Curve Defined Parametrically: Eliminate the parameter t . Then use the rectangular equation to sketch the plane curve represented by the given parametric equations. Use arrows to show the orientation of the curve corresponding to increasing values of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

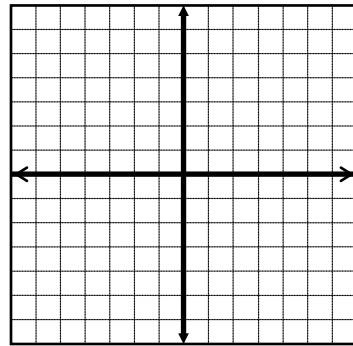
3) $x = \sqrt{t}, \quad y = 2t - 1$



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



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



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

