

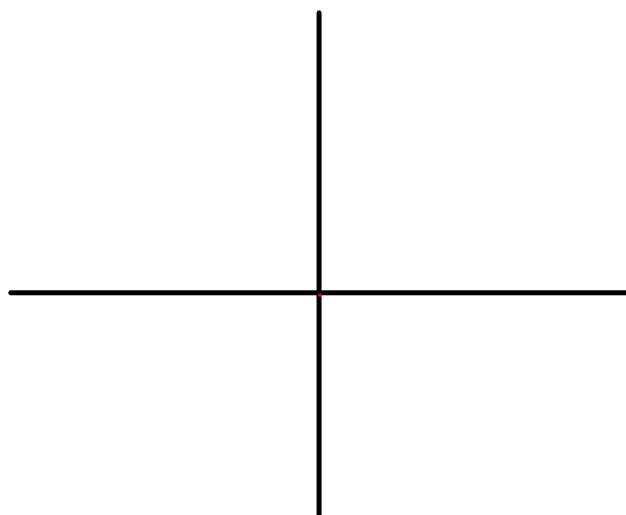
10.2 Plane curves and parametric equations

Defn.

- f and g are cont's functions of t on some interval
- $x=f(t)$ and $y=g(t)$ are called parametric equations
- t is called the parameter.
- the points (x,y) make up a plane curve

ex. Sketch the curve described by $x=4\cos(t)$ and $y=4\sin(t)$ for $0 \leq t \leq 2\pi$ and note the direction/orientation of the graph.

t	x	y



ex. Use the calculator to graph the curve described by $x=2\cos(t)$ and $y=-2\cos(t)$ for $0\leq t\leq 2\pi$ and note the direction/orientation of the graph.

Solving one parametric equation for t and substituting into the other is called eliminating the parameter and is the way to change to rectangular form.

ex. Use the calculator to graph the curve described by $x=t^2-5t$ and $y=2t-1$, for t in $[0,6]$, note the direction/orientation of the graph, and rewrite in rectangular form.

ex. Eliminate the parameter in $x=5\cos(t)$ and $y=3\sin(t)$ to write the equation of the curve in rectangular form.

ex. Express $y=4x^2-1$ in parametric form 3 different ways:

a. Let $x=t$.

b. Let $x=t+1$.

c. Let $m=dy/dx=8x$.

Defn. A curve C represented by $x=f(t)$ and $y=g(t)$ on an interval I is called smooth if f' and g' are continuous on I and not simultaneously 0, except possibly at the endpoints of I .

ex. Determine whether $x=2(t-\sin t)$ and $y=2(1-\cos t)$ define a smooth curve.