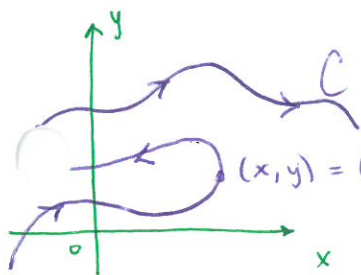


Section 10.1 - Parametric Equations

Vector Calc



* C cannot be written as $y=f(x)$ but both x and y can be thought of as functions of time.

Parametric Equations: $x=f(t)$, $y=g(t)$, $z=h(t)$...

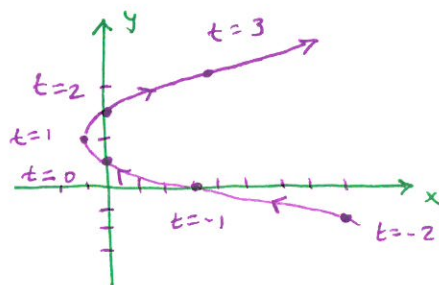
Parameter: t , each value of t determines a point (x, y) on C

Parametric Curve: $C = \{(x, y) = (f(t), g(t)) \mid t \text{ in domain of time}\}$

Example 1 Sketch and identify the curve defined by

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

t	x	y
-2	8	-1
-1	3	0
0	0	1
1	-1	2
2	0	3
3	3	4



$$t = y - 1 \text{ so}$$

$$x = (y-1)^2 - 2(y-1)$$

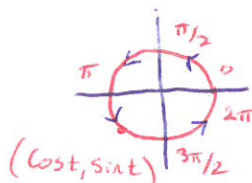
$$x = y^2 - 4y + 3$$

Example 2 What curve is represented by the following parametric equations?

$$x = \cos t \quad y = \sin t \quad 0 \leq t \leq 2\pi$$

$$x^2 + y^2 = \cos^2 t + \sin^2 t = 1$$

Unit Circle

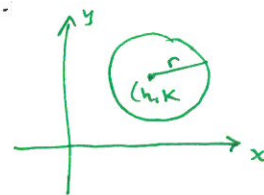


Example 4 Find parametric equations for the circle with center (h, k) and radius r .

$$\text{Radius } r: \quad x = r \cos t \quad y = r \sin t \quad 0 \leq t \leq 2\pi$$

$$\text{Center } (h, k): \quad x = h + r \cos t \quad y = k + r \sin t \quad 0 \leq t \leq 2\pi$$

(More x by h , y by k)



Example 6 Use your graphing Calc to graph

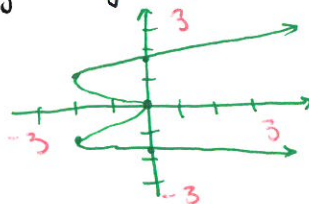
$$x = y^4 - 3y^2 \quad x = t^4 - 3t^2, \quad y = t$$

* For Fun Graph

$$x = \sin t - \sin 2.3t$$

$$y = \cos t$$

$$0 \leq t \leq 70 \quad -2 \leq x \leq 2 \quad -1 \leq y \leq 1$$



$$-10 \leq t \leq 10$$

mode $\frac{DVR}{Y=}$
 $X_1 = X \quad Y_1 = Y$