

## LESSON 7: PARAMETRIC EQUATIONS

Objectives: 1. To use parametric equations to graph relations

### Definitions

If  $x$  and  $y$  are given as functions and  $x = f(t)$  and  $y = g(t)$  over an interval of  $t$ -values, then the set of points  $(x,y) = (f(t),g(t))$  is a parametric curve and the equations are called parametric equations.

### Examples

- With your calculator in parametric mode, graph the equations  $x = 3\cos(t)$  and  $y = 3\sin(t)$  in a square viewing window.
  - What figure did you get?
  - Change the parametric intervals to each of the following and look at each graph.  
 $\left[0, \frac{\pi}{2}\right]$ ,  $[0, \pi]$ ,  $\left[0, \frac{3\pi}{2}\right]$ ,  $[\pi, 2\pi]$ ,  $[2\pi, 4\pi]$
  - What is the role of the interval in the graph of each parametric?
  - Show algebraically that the equations  $x = 3\cos(t)$  and  $y = 3\sin(t)$  on  $[0, 2\pi]$  is a circle with the center at the origin and radius 3.
- Ball in Air Simulation

Graph	$X_{1t} = -3$	Mode:	Parametric
	$Y_{1t} = (2T)(T \leq 2)$		Simultaneous
	$X_{2t} = -3$	Window:	Tmin =0
	$Y_{2t} = (-2T + 8)(T > 2)(T \leq 4)$		Tmax =
	$X_{3t} = T$		Tstep =.13
	$Y_{3t} = -(T - 2)^2 + 4$		Xmin -10
			Xmax 10
			Xscl = 1
			Ymin =0
			Ymax 5
			Yscl =1
- Graph  $x = 4t$ ,  $y = 3-5t$  on  $0 \leq t \leq 1$ . What figure do you get? What are its domain, range and equation in rectangular coordinates?