

CSC232 - Lecture 1

Introduction to Parametric Equations

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Prepared for January 6, 2025

Parametric Equations

Recall the following from high school and first-year calculus:

Equation Type	Example
Cartesian Equation	$y = x^2$
Function in Cartesian Form	$y = f(x) = x^2$
Parametric Equation	$\begin{cases} x = t \\ y = t^2 \end{cases}$

Table 1: Comparison of equation representations

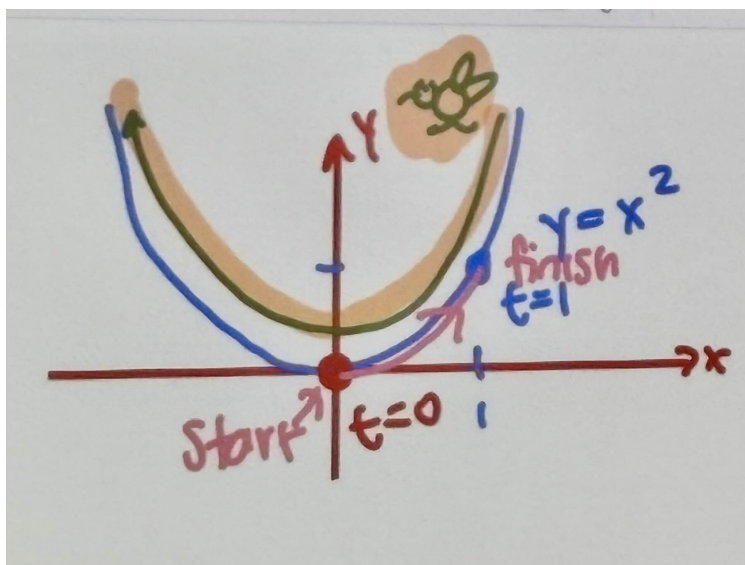


Figure 1: Graph of a parabola: $y = x^2$

Parametric equations are of the form:

$$x = f(t), \quad y = g(t), \quad t \in \mathbb{R}$$

For example:

$$x = t, \quad y = t^2, \quad t \in \mathbb{R}$$

This yields points such as:

$$(1, 1), \quad (0, 0), \quad (-1, 1)$$

Alternatively:

$$x = -t, \quad y = t^2, \quad t \in \mathbb{R}$$

This yields points such as:

$$(-1, 1), \quad (0, 0)$$

Drawing Parametric Equations

Two methods are commonly used to sketch parametric equations:

- Use a table of values for manual computation.
- Convert to a Cartesian equation (eliminate t) and sketch the graph, if possible.

Example: Sketch $x = t^2, y = t^3$ for $-\infty < t < \infty$.

Table of Values:

t	$x = t^2$	$y = t^3$	(x, y)
2	4	8	(4, 8)
1	1	1	(1, 1)
0	0	0	(0, 0)
-1	1	-1	(1, -1)
-2	4	-8	(4, -8)

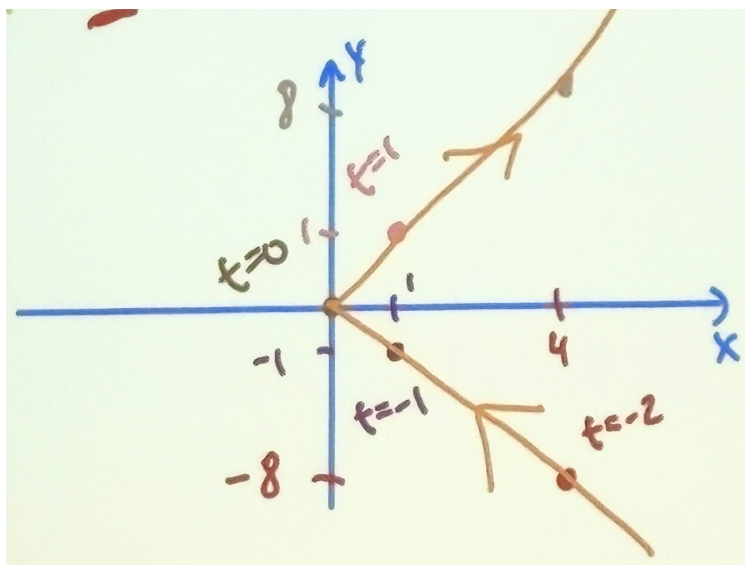


Figure 2: Sketch of $x = t^2, y = t^3$