Other Representations of Functions.

Note Title 2016-05-13

Review

$y = f(x)$

eg) a line

$y = mx + b$ slope intercept

$y - y_0 = m(x - x_0)$ point-slope

$ax + by = c$ general form.

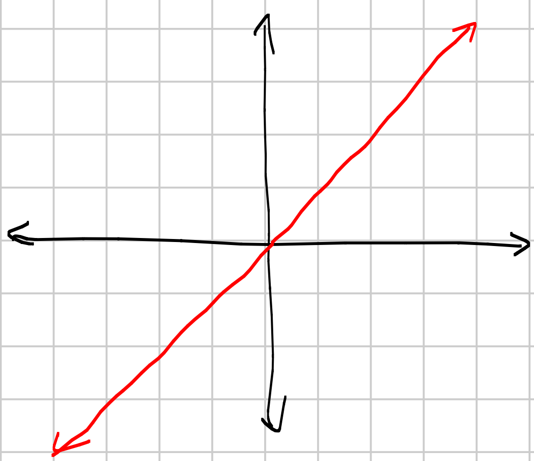
$m = \frac{y_2 - y_1}{x_2 - x_1}$

These are just algebraic manipulations of each other.

Recall that $y = f(x)$ must pass the vertical line test to be a function!

If we use different representations we can still have functions that don't pass the vertical line test!

Parametric Representation.



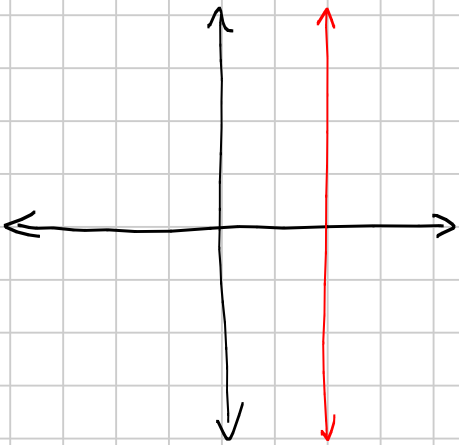
Explicit Form: $y = x$

Parametric Form: $x = t$
$y = t$
$t \in \mathbb{R}$

By substitution, we can see that $y = x$.

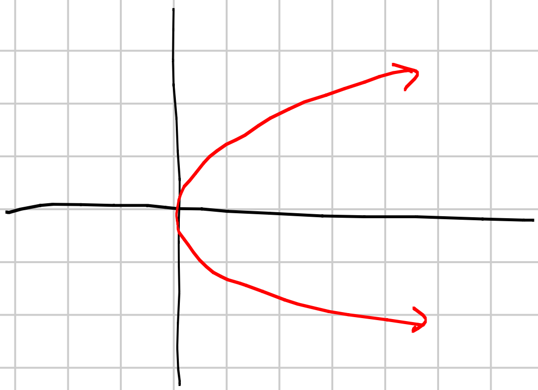
Loosely, we can think of t as being time and there is only one (x, y) for any time t.

Another example:



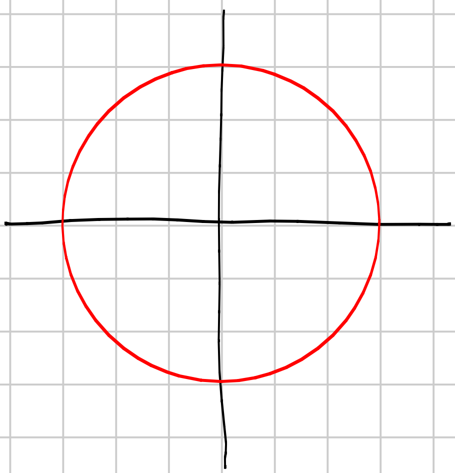
Explicit form: $x=2$
Not a function in explicit form!
(Doesn't pass VLT).

Parametric: $x=2$
$y=t$
It's a function! Think about where it's pointing to at any time t.



Explicit: $y=\pm\sqrt{x}$
Not a function!

Parametric: $y=t$
$x=t^2$
It's a function!



Implicit: $x^2+y^2=9$
Explicit: $y=\pm\sqrt{9-x^2}$
Not functions.

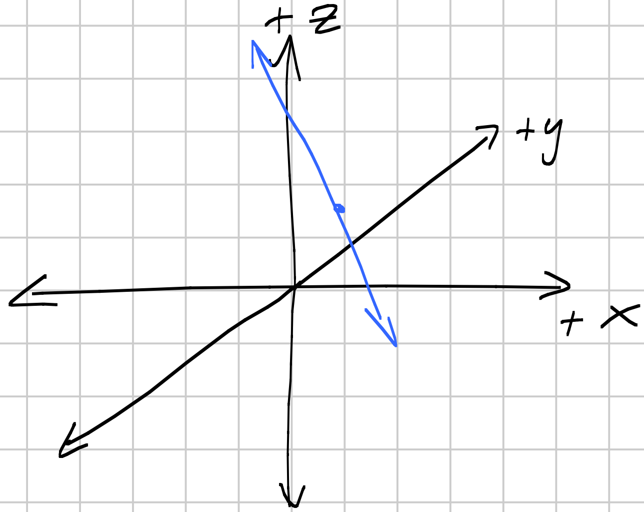
Parametric: $x=3\cos t$
$y=3\sin t$
It's a function.

Conversion between implicit/explicit to parametric has no general procedure. You have to learn all the different ways.

Parametric Representation makes it easy to define a line in 3D.

eg)

$x = 2t + 1$
$y = t - 3$
$z = -3t + 4$



More Representations (Coordinate Systems):

Polar Coordinates.
Cylindrical Coordinates
Spherical Coordinates