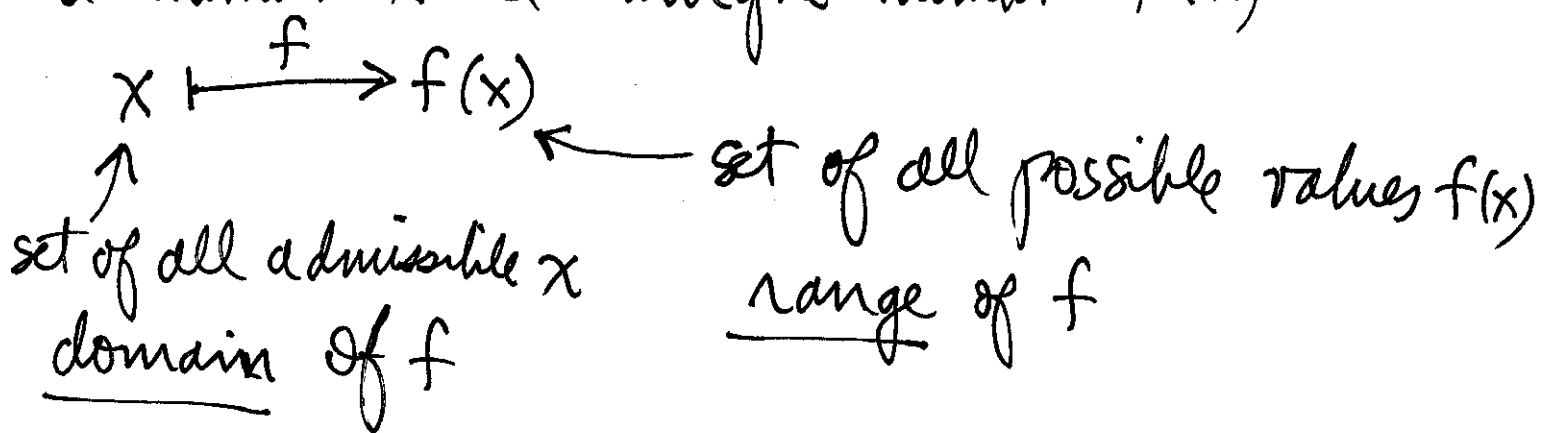


Lesson 0

The laws of the universe are written in the language of mathematics.

§§ 1.1 + 1.2 - Review of Functions

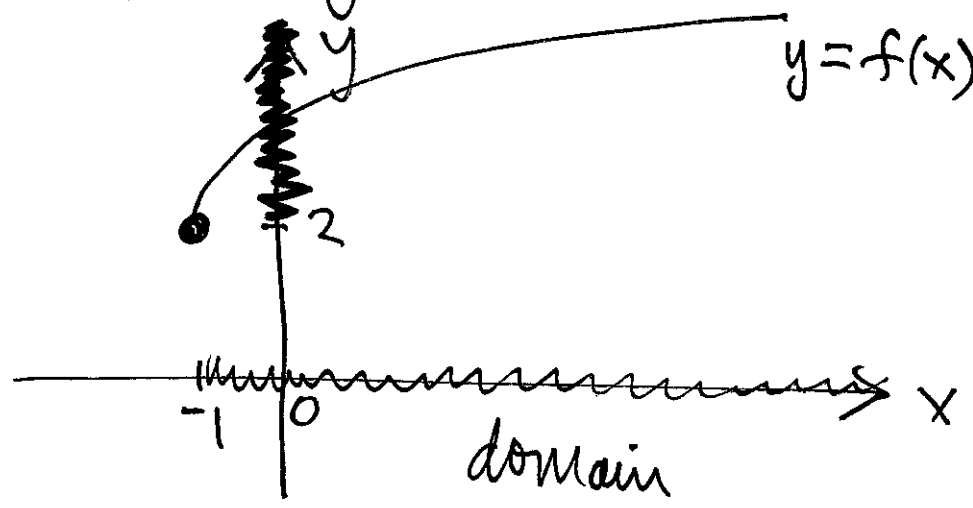
A function f is a rule which assigns to a number x a unique number $f(x)$



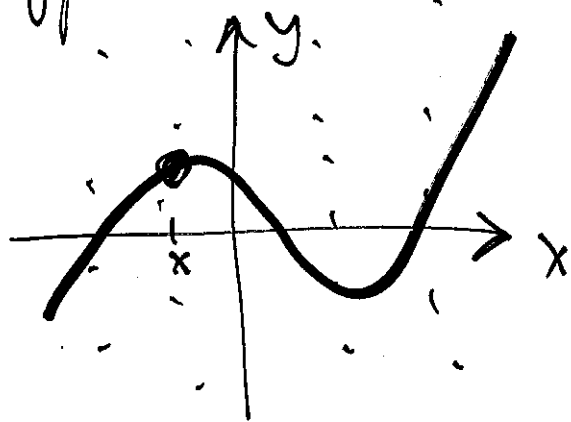
$$y = f(x) = 2 + \sqrt{x+1}$$

$x+1 \geq 0$
 domain of f is $x \geq -1$
 $[-1, \infty)$

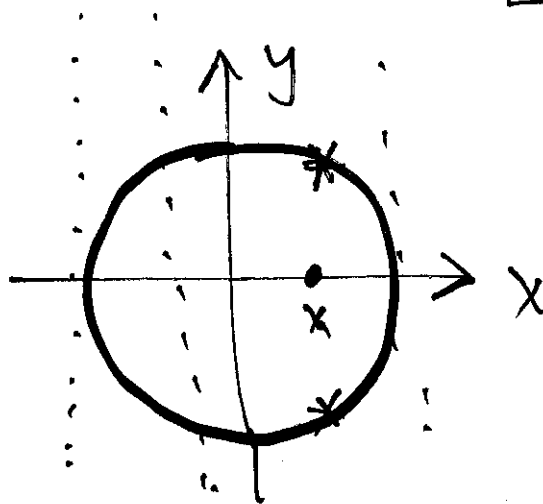
range of f is $y \geq 2$



Suppose



Represents the graph of a function

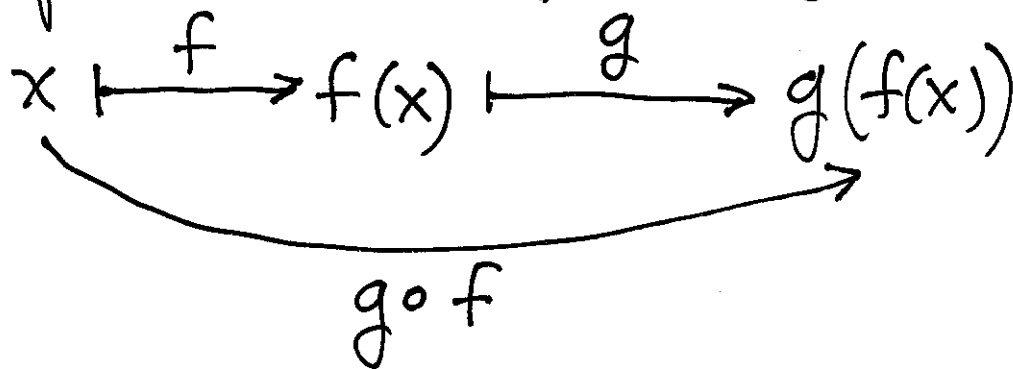


Does not represent graph of a function

Vertical Line Test (VLT)

A curve represents ^{the} graph of a function \iff every vertical line intersects curve at most once

Composite Functions $f(x), g(x)$



$$f(x) = x^2 - 4, \quad g(x) = \frac{3}{x}$$

$$(g \circ f)(x) = g(f(x)) = g(x^2 - 4) = \frac{3}{x^2 - 4}$$

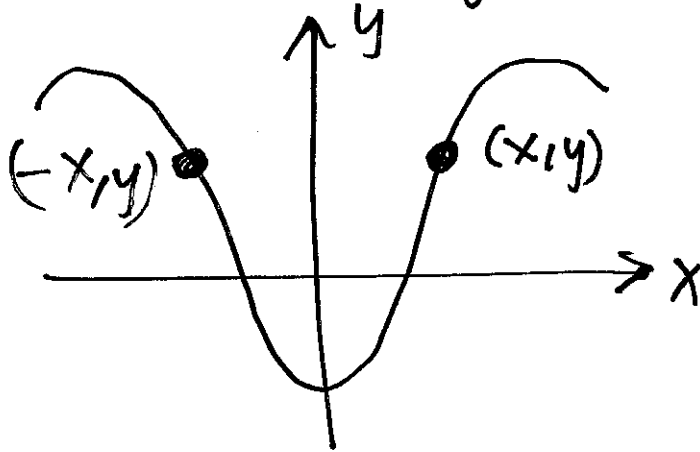
$$(f \circ g)(x) = \frac{9}{x^2} - 4 \quad \therefore f \circ g \neq g \circ f$$

in general

Symmetry in Curves C

① C is symmetric w.r.t. y-axis

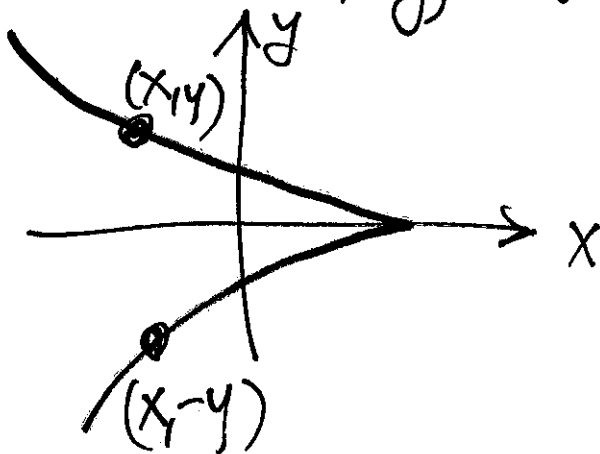
if (x, y) on C $\Rightarrow (-x, y)$ also on C



② C is symm. w.r.t. x-axis

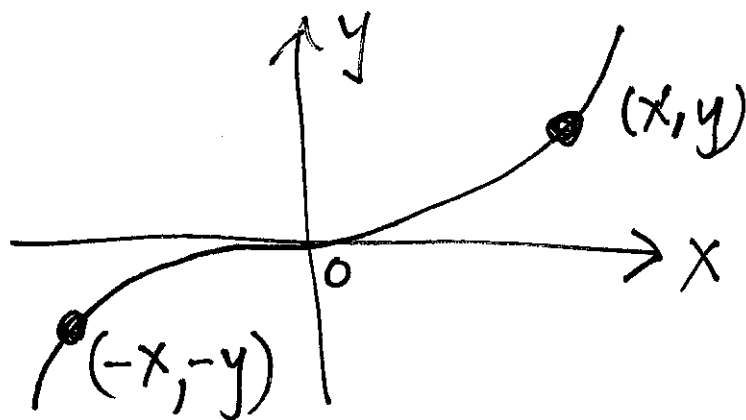
4

if (x, y) on C $\Rightarrow (x, -y)$ also on C



③ C is symm. w.r.t. origin

if (x, y) on C $\Rightarrow (-x, -y)$ also on C



Transformations of Functions $y = f(x)$ [5]

(a) $y = f(x) + c$ Vertical shift c units

(b) $y = f(x + c)$ Horizontal shift $-c$ units

