

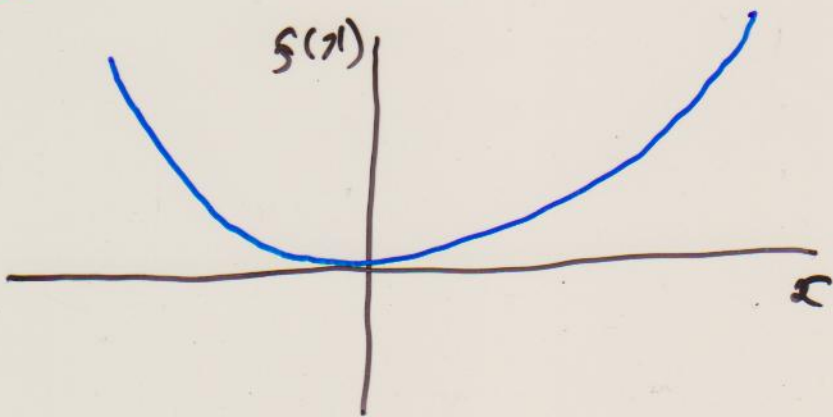
# Functions

- A function  $f: D \rightarrow C$  consists of
- 1) a set  $D$  called the domain.
  - 2) a set  $C$  called the codomain.
  - 3) a rule that assigns an element  $f(x) \in C$  to each  $x \in D$ .

Example  $f: \mathbb{R} \rightarrow \mathbb{R}$  with  
 $f(x) = x^2$ .

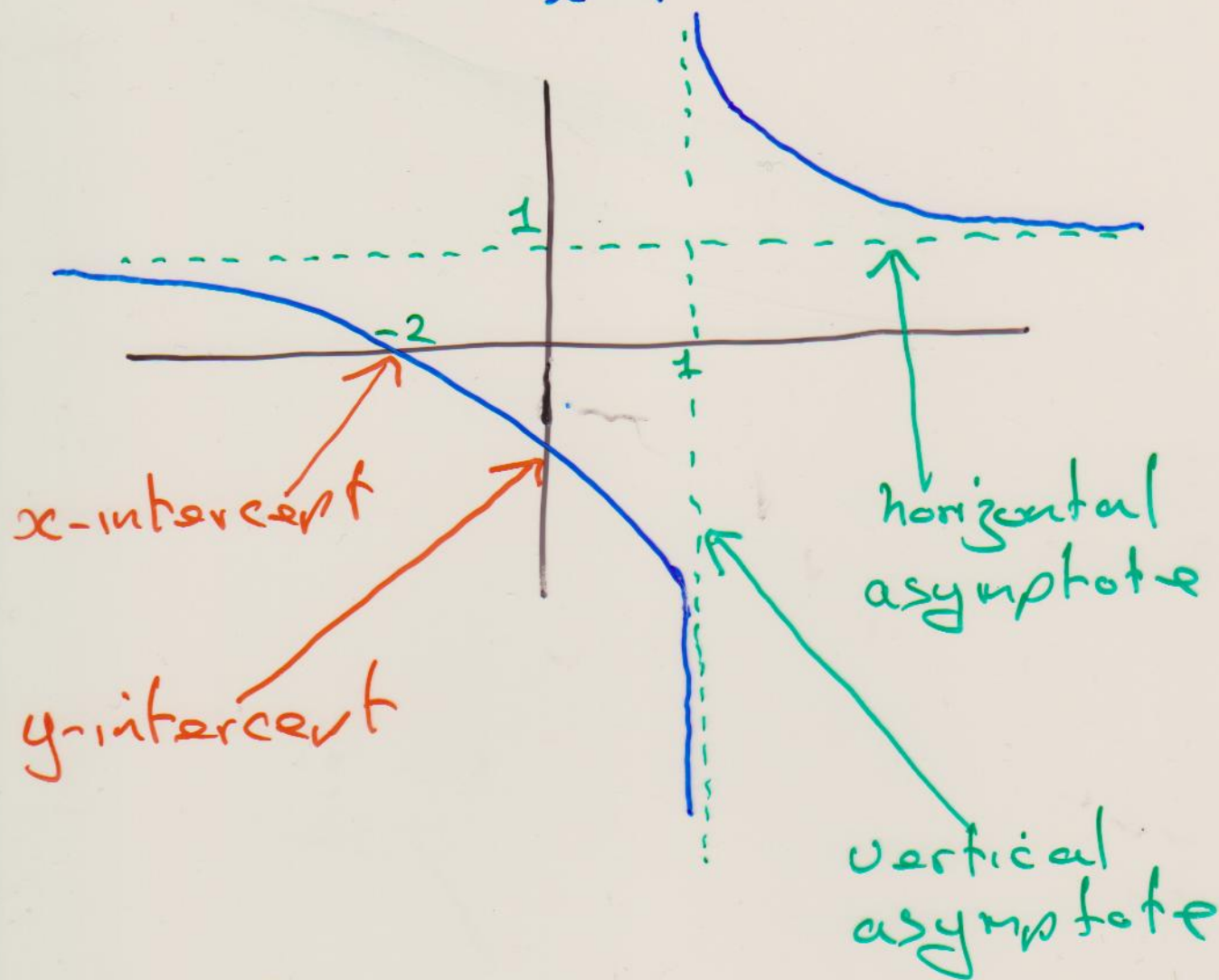
$$D = \mathbb{R}, \quad C = \mathbb{R}$$

Its graph



Example  $g: \mathbb{R} - \{1\} \rightarrow \mathbb{R}$

with  $g(x) = \frac{x+2}{x-1}$



Convention

often we use a formula

such as  $h(x) = \frac{x+2}{x-3}$  to

describe a function, without  
initially stating a domain

In this situation we always assume the domain is the largest possible set for which the formula makes sense.

We take  $C = \mathbb{R}$ .

### Examples

i)  $h(x) = \frac{x+2}{x-3}$  ,  $D = \mathbb{R} - \{3\}$ .

ii)  $q(x) = \sqrt{x}$  ,  $D = [0, \infty)$   
 $= \{x : x \geq 0\}$

iii)  $p(x) = \sqrt{x^2 - 1}$  ,

$$D = (-\infty, -1] \cup [1, \infty)$$

$$= \{x : x \leq -1\} \cup \{x : x \geq 1\}$$



$$iv) r(x) = \sqrt{\frac{1}{x}}$$

$$D = (0, \infty)$$

$$= \{x : x > 0\}.$$

Question Which of the following are graphs of functions of  $x$ .

Answer: A & D are functions

