



2. Functions & Mappings

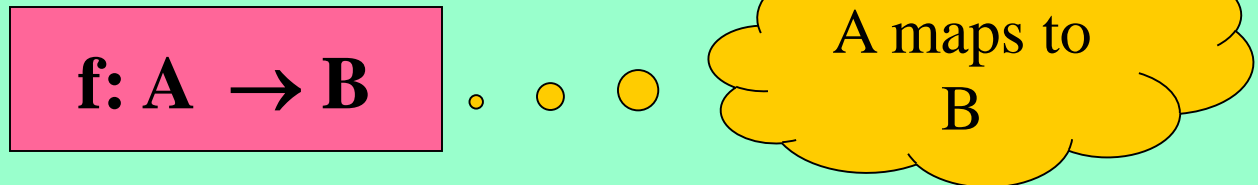
MAPPING-

A rule that **links elements** from one set with those of another

FUNCTIONS & MAPPINGS

Defn: A function or mapping is a relationship between two sets in which each member of the first set is connected to exactly one member in the second set.

If the first set is A and the second B then we often write



The members of set A are usually referred to as the domain of the function (basically the starting values or even x-values) while the corresponding values or images come from set B and are called the range of the function (these are like y-values).

Functions can be described in three ways:

- (a) By a formula
- (b) By an arrow diagram
- (c) By a graph (a coordinate diagram)

Example

$$f : A \rightarrow B \quad \text{where } f(x) = x^2 - x \quad \text{and} \quad A = \{-2, -1, 0, 1, 2\}$$

- (a) Find the range (b) draw an arrow diagram (c) draw a graph

Solution:

$$f(-2) = (-2)^2 - (-2) = 6$$

$$f(1) = 1^2 - 1 = 0$$

(a) Range = B $f(-1) = (-1)^2 - (-1) = 2$

$$f(2) = 2^2 - 2 = 2$$

$$f(0) = (0)^2 - 0 = 0$$

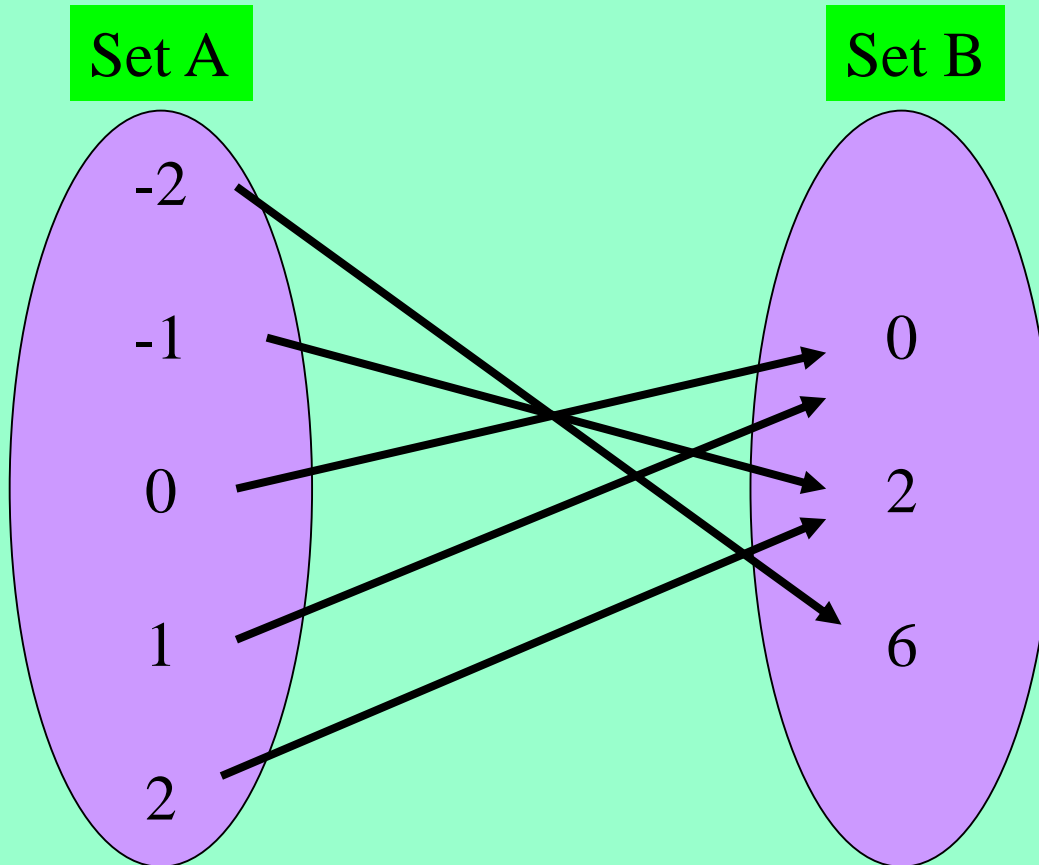
$$\text{Range} = \{0, 2, 6\}$$

Solution (Cont.) :

Range = {0, 2, 6}

$f : A \rightarrow B$ where $f(x) = x^2 - x$ and $A = \{-2, -1, 0, 1, 2\}$

(b)

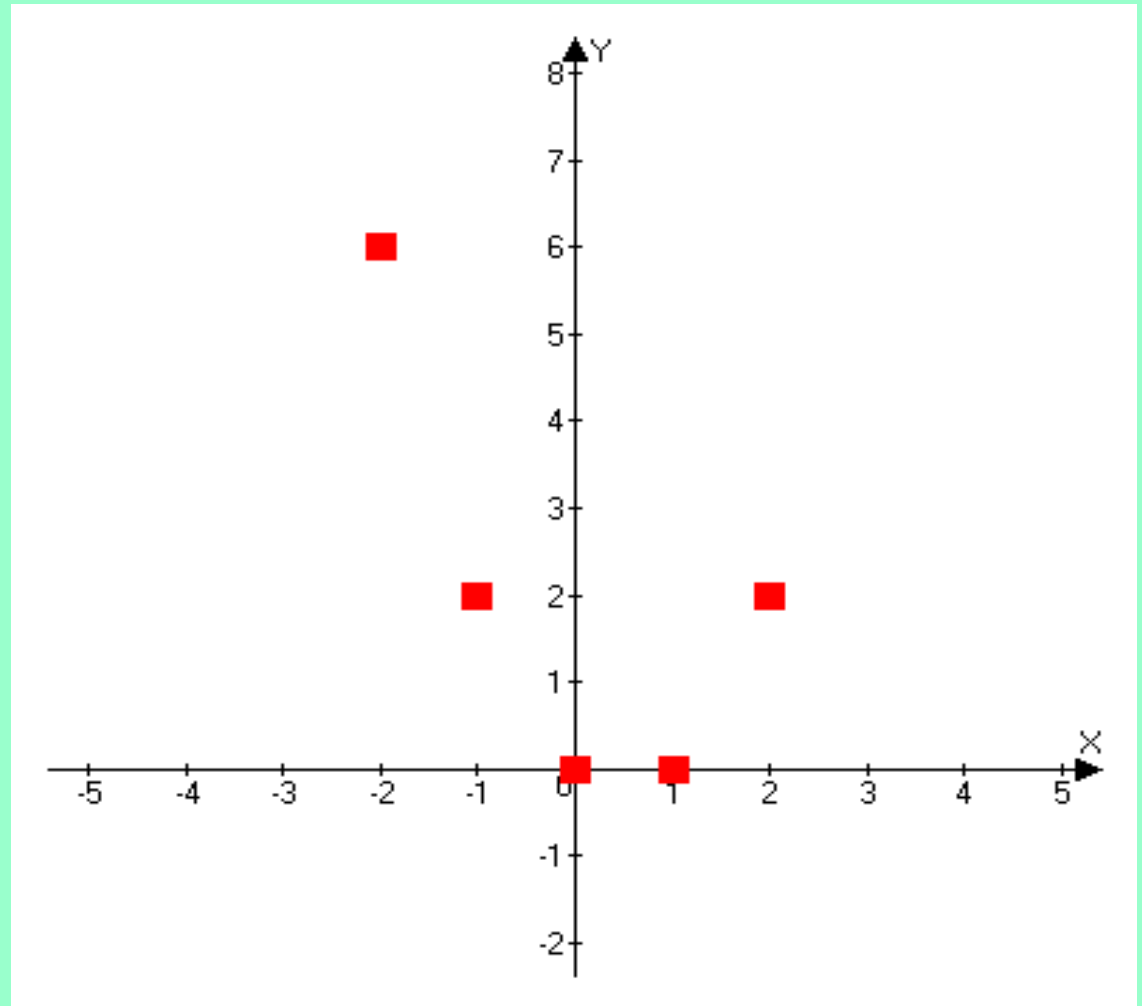


NB. For a function there should only be one arrow coming from each element of set A

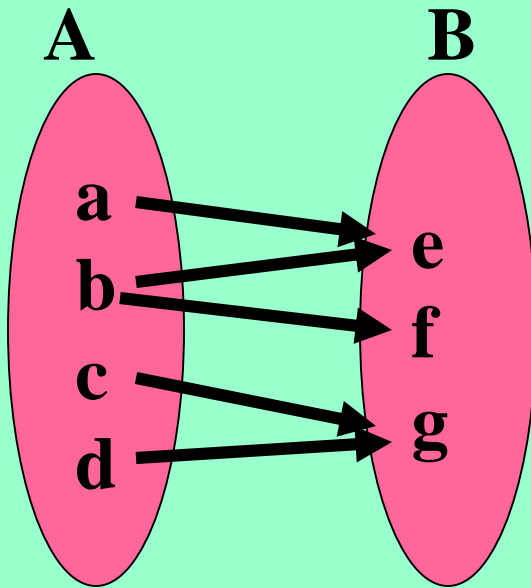
Solution (Cont.) :

(c)

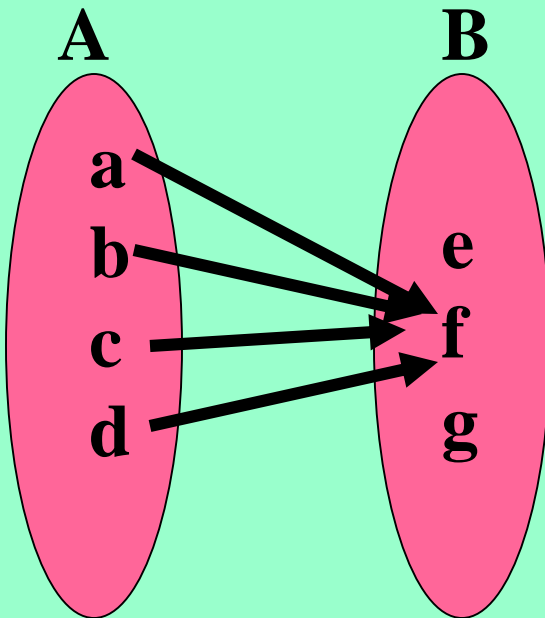
NB the graph is simply
points not a solid line



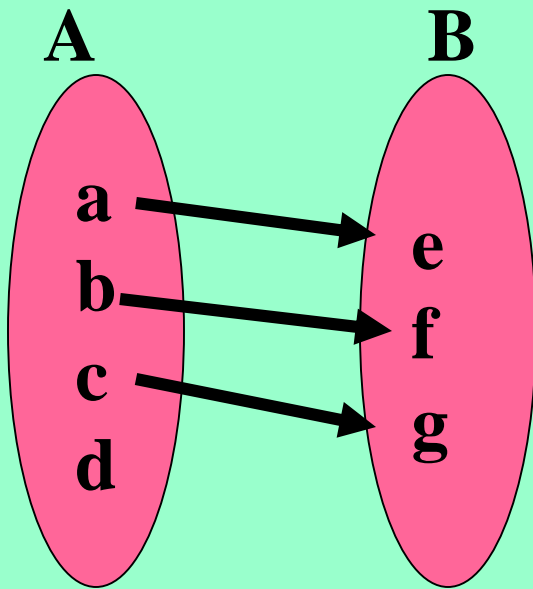
Recognising Functions



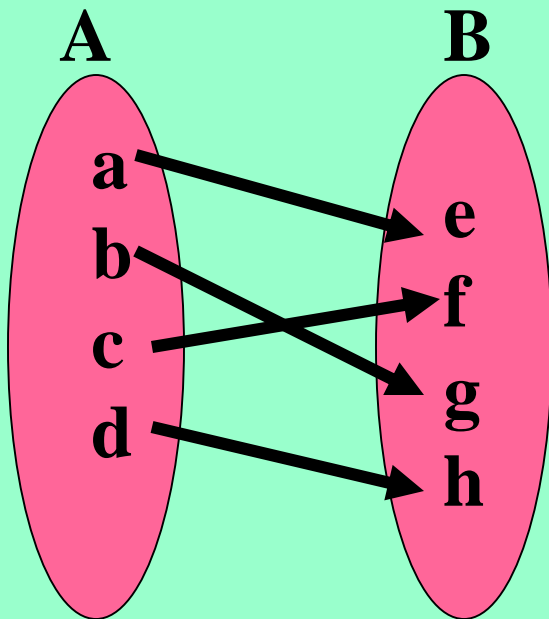
**Not a function -
two arrows leaving b!**



YES



Not a function - d unused!

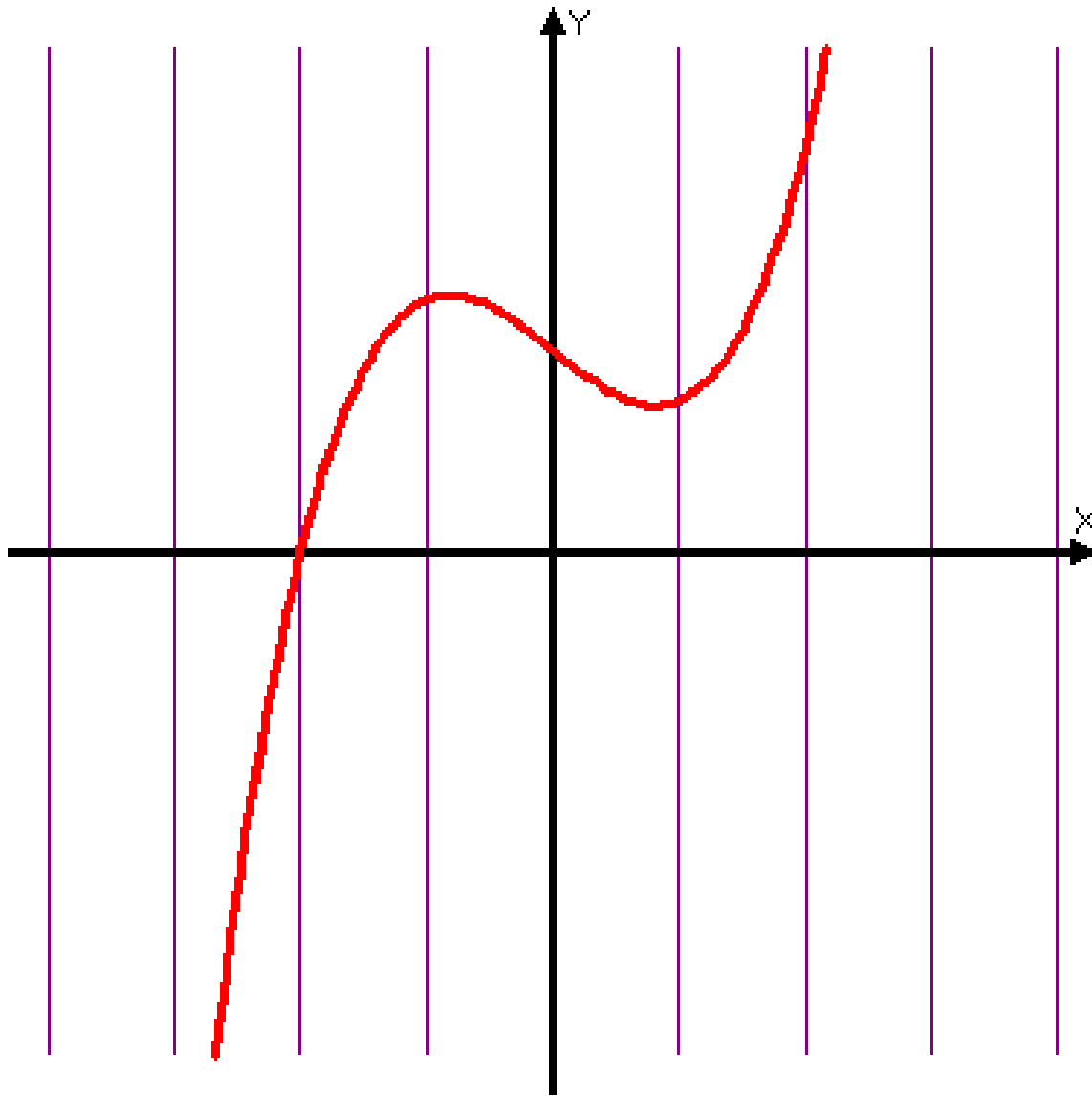


YES

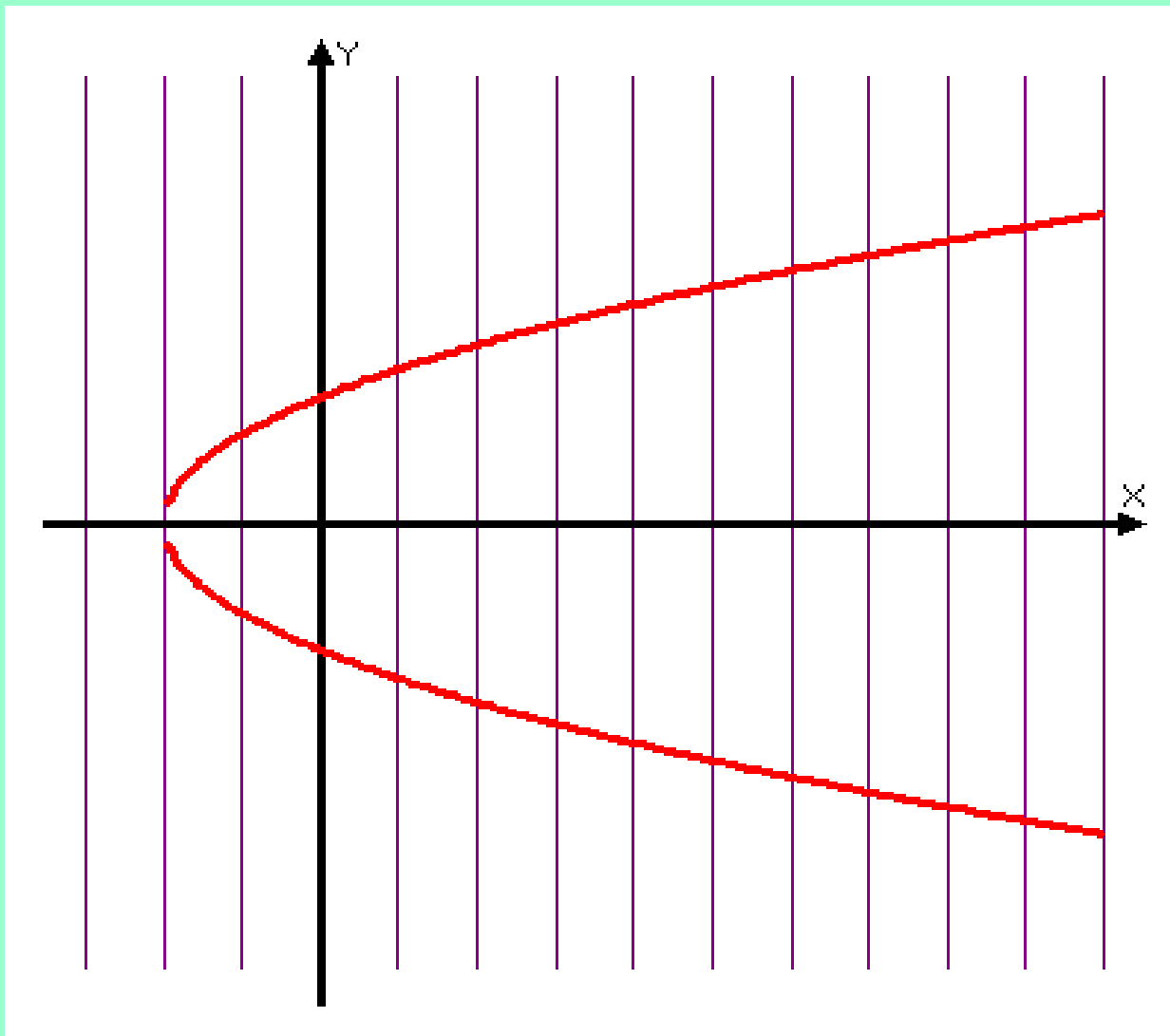
Recognising Functions from Graphs

If we have a function $f: \mathbb{R} \rightarrow \mathbb{R}$ (\mathbb{R} - real nos.) then every vertical line we could draw would cut the graph exactly once!

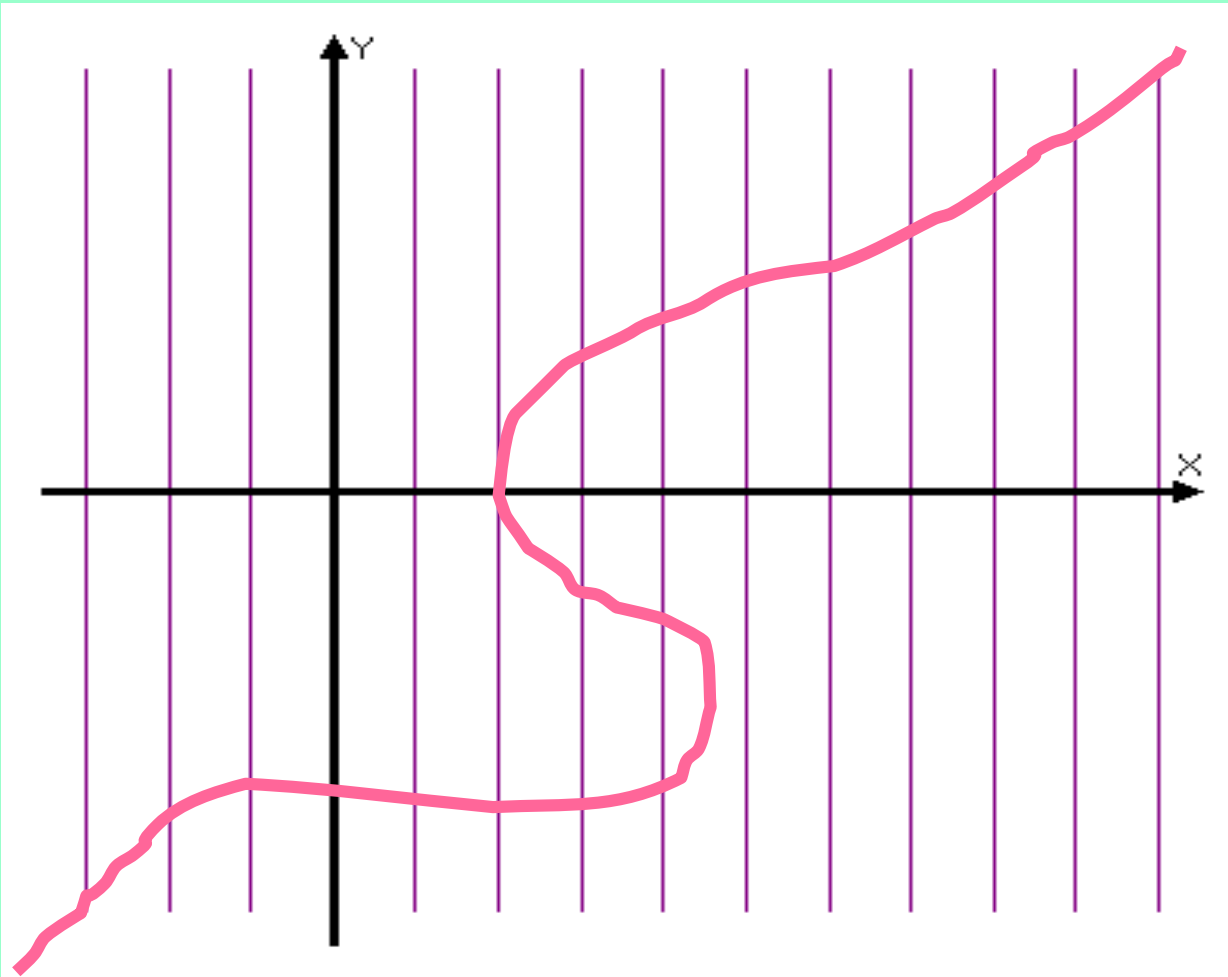
This basically means that every x-value has one, **and only one**, corresponding y-value!



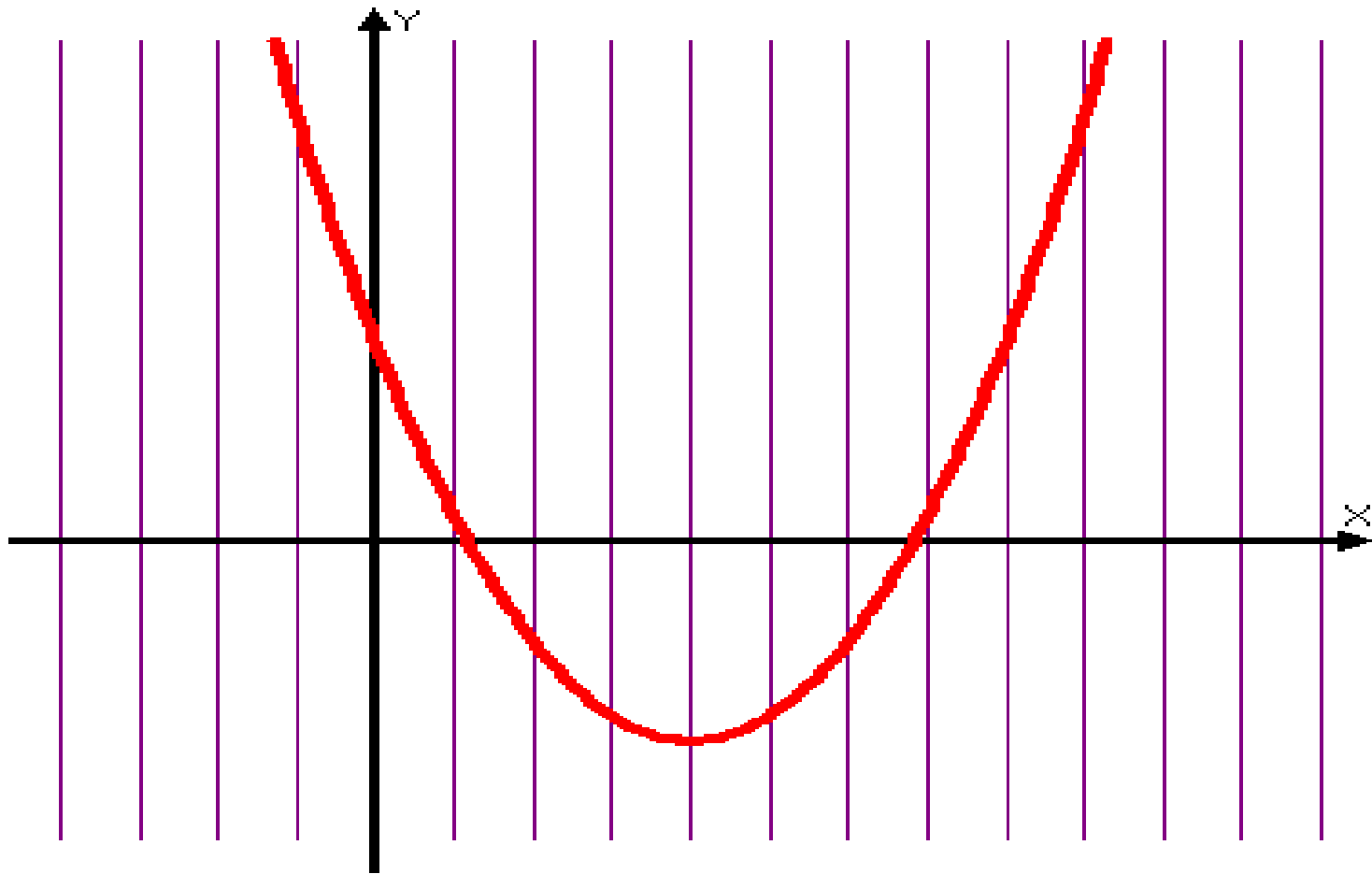
This is a function-
every vertical line
cuts graph only once



NOT a function – vertical lines cut more than once



NOT a function – some vertical lines cut more than once



This is a function

Heinemann , p.24, EX 2B
Q1, 4, 5, 7, 8