

- 2.3 Functions -

23 p1

Objectives

Relations, Functions

Domain, Range.

Vertical line test.

Function Notation.

Increasing & Decreasing function.

A relation is a set of ordered pairs

It can be given by a list or by an equation relating the two variables.

Exp 1.

$$E = \{(-1, 2), (1, 0), (-1, 3), (0, 2), (2, 3)\}$$

is a relation (given by a list)

$$F = \{(x, y) \mid x^2 + y = 1\}$$
 is also a relation

It is given by an equation.

A Function is a relation in which no two ordered pairs have same first component & different second coordinates.

Exp 2.

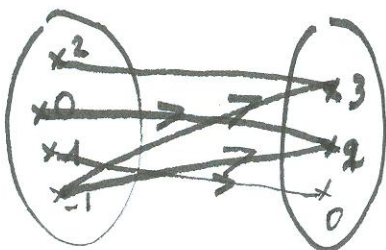
$$E = \{(-1, 2), (1, 0), (-1, 3), (0, 2), (2, 3)\}$$

is a relation but not a f^n (because of $(-1, 2), (-1, 3)$)

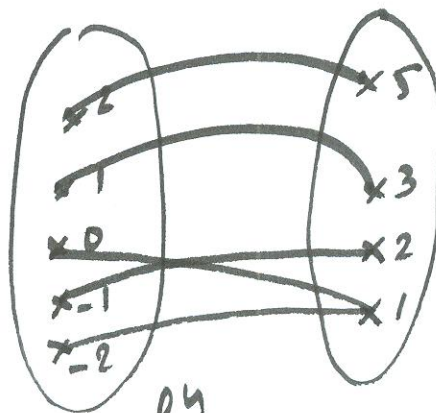
$$G = \{(-2, 1), (-1, 2), (0, 1), (1, 3), (2, 5)\}$$

is a function.

Relations & Diagrams



not f^n



f^n

How can we show a relation defined by an eqⁿ is a f^n

1. Solve eqⁿ for y (the second variable)
 2. If there is ~~one~~ solⁿ y, it is a function
- If there are more sol^{ns}, it is not a function.

Exp 3. Check for every eqⁿ if it defines a function or not.

(2.3 p3)

a) $x + 1 + y = 0$

b) $x^2 + y^2 = 1$

c) $|y - 2| = x$

e) $y^3 = x^2 + 3$

a) $y = -x - 1 \rightarrow f^n$

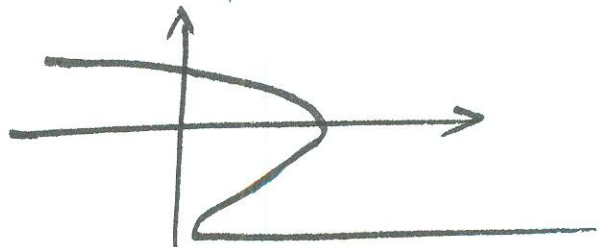
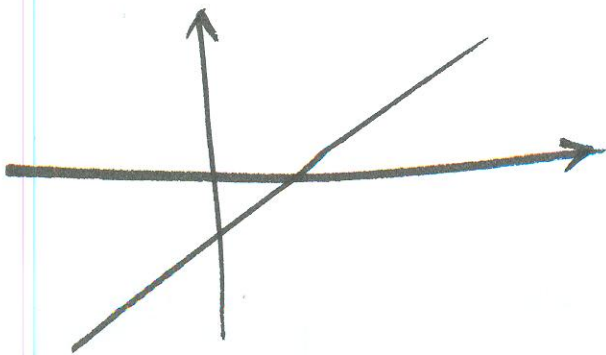
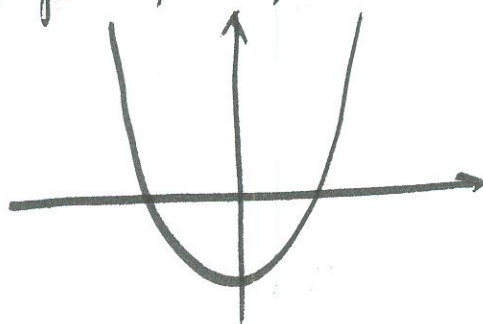
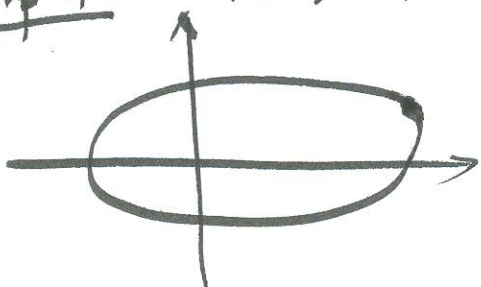
b) $y = \pm \sqrt{1 - x^2}$ not f^n

Use of the graph to check if a relation defines a f^n .

Vertical line test

A relation is a function if its graph cuts an vertical line at one point at most.

Exp 4 Which is the graph of a f^n ?



Domain & Ranges

The domain of a relation (or function) is the set of the first coordinates in all the pairs of the relation.

The range of a relation is the set of the second coordinates of all pairs of the relation.

Ex 5. $E = \{(-2, 1), (-1, 1), (0, 2), (1, 3)\}$

Domain: $\{-2, -1, 0, 1\}$

Range: $\{1, 2, 3\}$

For equations, the domain of a function is the set of numbers x for which y is defined.