

Patterns and Nonlinear Functions Guided Notes

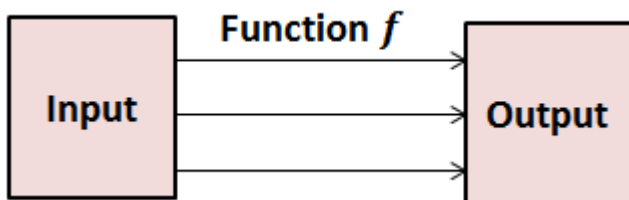
Patterns and their Representations

In mathematics, anything arranged following a certain rule or a set of rules represent a pattern. The relation represented in a pattern can be represented in the following ways:

- **Table**
- **Graph**
- **Ordered Pairs**
- **Words**
- **Equation**

Function

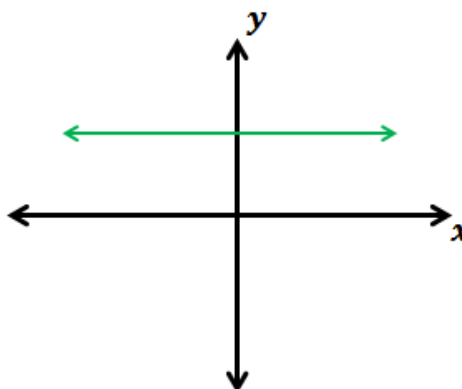
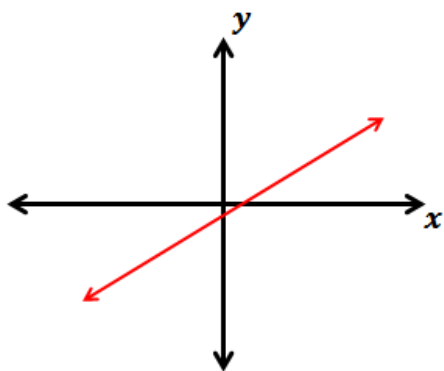
A function is a relation in which each input is related to one and only one output.



Linear Function

A function is a linear function whose graph makes a straight line.

Examples:



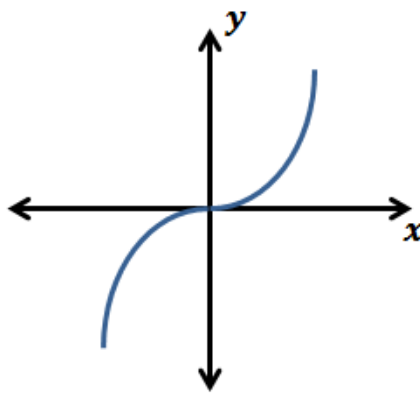
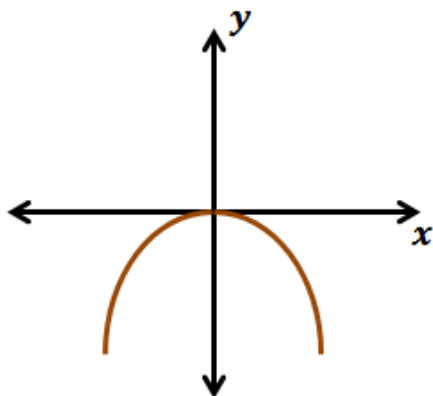
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Nonlinear Function

A function is a nonlinear function whose graph does not a straight line.

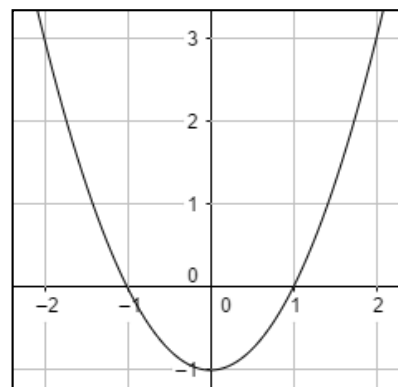
Examples:



Problem 1: Graph the function shown by the table given below. Also tell whether the function is linear or nonlinear.

x	y
0	-1
1	0
2	3
3	8

Since the graph is not a straight line, the data in the table represents a **nonlinear** function.



Graph

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Function Rule

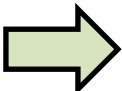
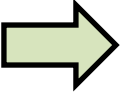
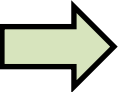
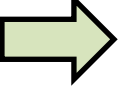
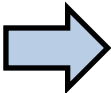
A function rule is a mathematical rule that can be used to describe the general trend of the function. A rule can be taken as an **equation** representing any relationship.

Finding a function rule is like solving a puzzle. When we are given a list of function values and asked to find the rule representing the function, it's like solving a puzzle. In finding the rules, we need to identify the operation involved in relating the data. The operations can be multiplication, addition, subtraction, division, power, square root etc.

Problem 2: The set of ordered pairs represent the function. Write a rule that represents the function.

(0,0), (1,1), (2,4), (3,9), (4, 16)

The trend in the values of x and y shows that each value of y is a **square** of the value of x . We can check it as:

$x = 0$		$y = (0)^2 = 0$
$x = 1$		$y = (1)^2 = 1$
$x = 2$		$y = (2)^2 = 4$
$x = 3$		$y = (3)^2 = 9$
		
$y = x^2$		