Calculus

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Introduction

Later add this section

Chapter 2

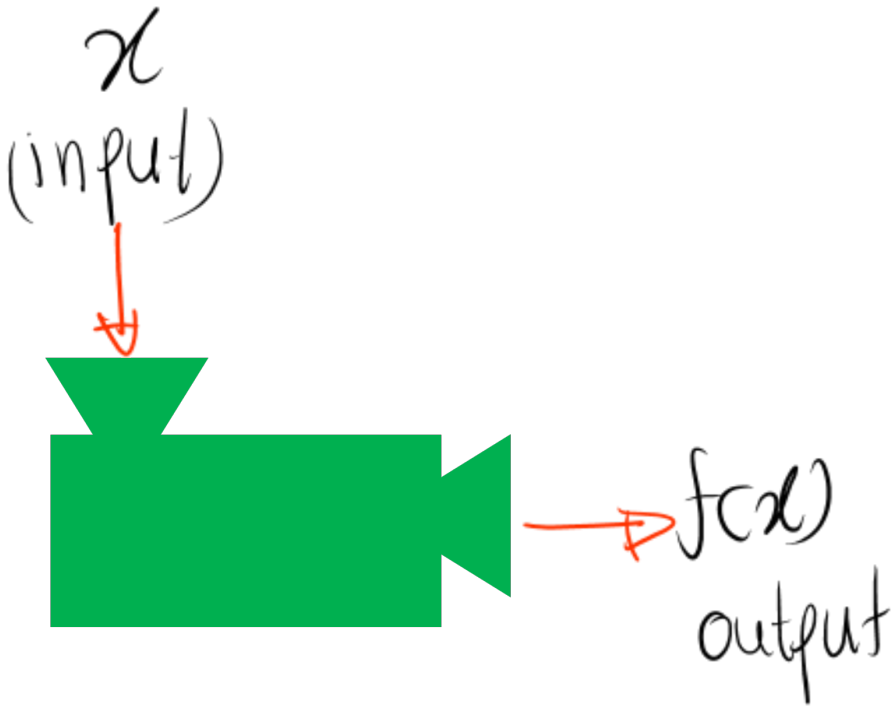
Functions

2.1 Functions

Definition 2.1. Let A and B be two nonempty sets. A function from A to B is a rule of correspondence that assigns to each element in set A exactly one element in B.

- The set A in the definition is called the domain of the function.
- The set B is called the co-domain of the function.
- The set of outputs is called the range of the function.

It's helpful to think of a function as a machine.



If is in the domain of the function then when enters the machine, it's accepted as an input and the machine produces an output according to the rule of the function. Thus we can think of the domain as the set of all possible inputs and the range as the set of all possible outputs.

The graph of also allows us to picture the domain of on the x-axis and its range on the y-axis as in Figure **??**.

2.1.0.1 Representing Functions

The rule describing the function can be represented by a:

- Picture

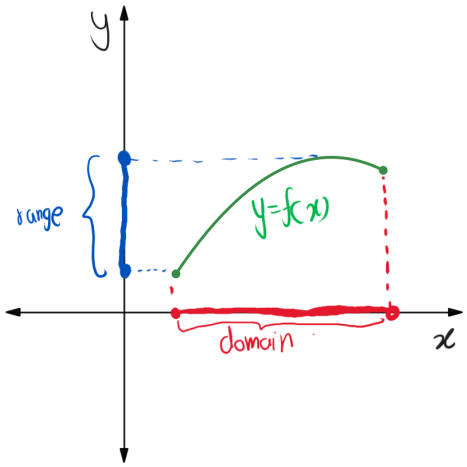
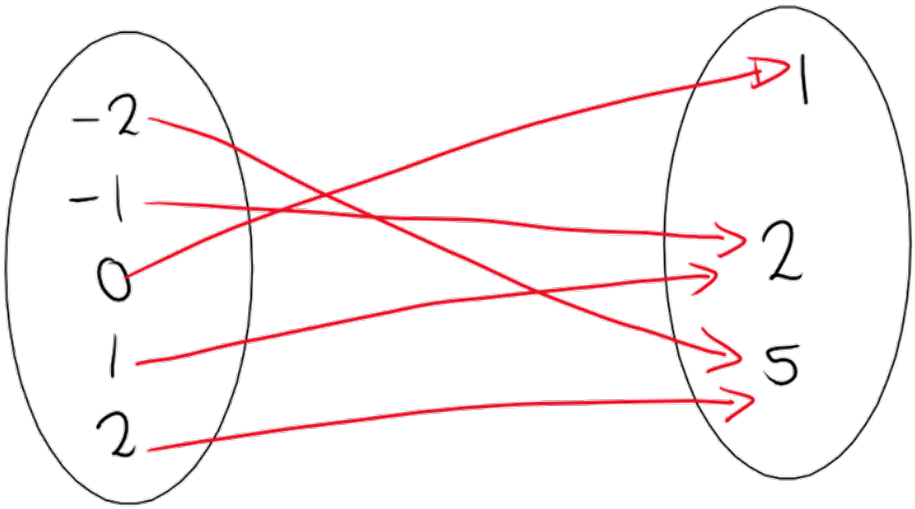


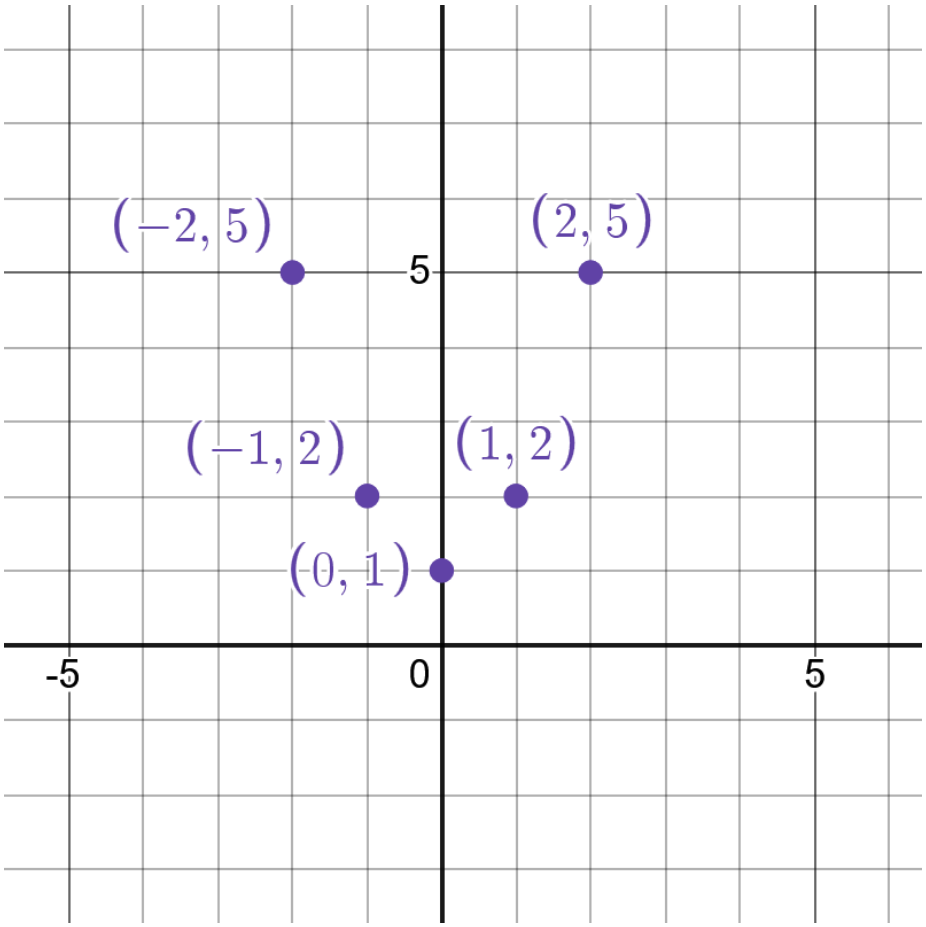
Figure 2.1: .



- Table

x	y
-2	5
-1	2
0	1
1	2
2	5

- Formula $A = \{-2, -1, 0, 1, 2\}, B = \{1, 2, 5\}$ and $f(x) = x^2 + 1$
- Cartesian product $A = \{-2, -1, 0, 1, 2\}, B = \{1, 2, 5\}$ and $f = \{(-2, 5), (-1, 2), (0, 1), (1, 2), (2, 5)\}$
- Graph



- Function Notation

$$f : A \to Bf(x) = \text{formula}$$

The graph of also allows us to picture the domain of on the x-axis and its range on the y-axis as in Figure

In this site, unless otherwise specified, the co-domain is the set of real numbers and the domain of a function is the set of real numbers for which the function is defined. We call this the domain convention.

Example 2.1. Determine the domain of each function