

Math 150 Lecture Notes Introduction to Functions

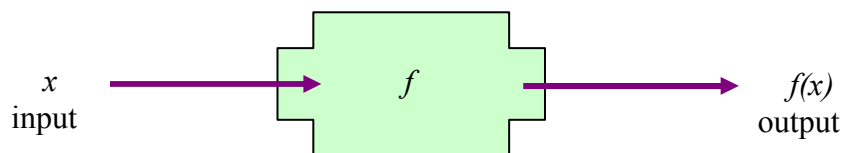
The term **function** is used to describe a dependence of one quantity on another.

A **function** f is a rule that assigns to each element x in set A exactly one element, called $f(x)$, in a set B . The set A is called the **domain** of the function. Set B is the **range** of the function.

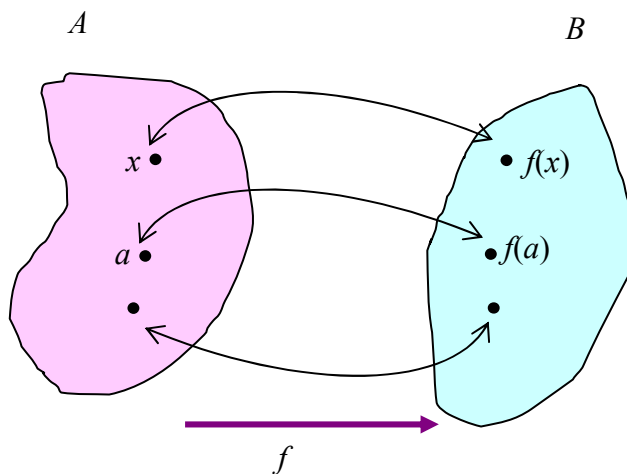
The symbol that represents a number in the domain of a function is called an **independent variable**. The symbol that represents a number in the range is called a **dependent variable**.

Representations of functional relationship:

Function Machine:



Mapping:



When the domain of a function is not explicitly stated, then by convention the domain of the function is the set of all real numbers for which the related expression is defined.

Functions may be represented or described in four ways:

- a) verbally
- b) algebraically
- c) graphically
- d) numerically

Example 1: Evaluate the piecewise defined function at the indicated values.

$$f(x) = \begin{cases} 3x & \text{if } x < 0 \\ x+1 & \text{if } 0 \leq x \leq 2 \\ (x-2)^2 & \text{if } x > 2 \end{cases}$$

$$f(-5), f(0), f(1), f(2), f(5)$$

Example 2: Use the function to evaluate the indicated expression and simplify.

$$f(x) = \frac{1}{x+1}$$

$$f(a+2)$$

$$f(a+h)$$

$$\frac{f(a+h) - f(a)}{h}, \text{ where } h \neq 0$$

Example 3: Find the domain of the function: $f(x) = \frac{x^4}{x^2 + x - 6}$

Example 4: Find the domain of the function: $g(x) = \sqrt{x^2 - 2x - 8}$