

ANALYSIS BASICS

Function

Definition

Given two sets A and B , a function from A to B is a rule or mapping that takes each element $x \in A$ and associates with it a single element of B . We write $f : A \rightarrow B$. Given an element $x \in A$, the expression $f(x)$ is used to represent the element of B associated with x by f .

The set A is called the domain of f .

The range of f is not necessarily equal to B but refers to the subset of B given by $\{y \in B : y = f(x) \text{ for some } x \in A\}$.

Dirichlet function

The Dirichlet function is defined as:

$$f(x) = \begin{cases} 1 & \text{if } x \in \mathbb{Q} \\ 0 & \text{if } x \notin \mathbb{Q} \end{cases}$$

The domain is \mathbb{R} .

Absolute value function

The absolute value function is defined as:

$$f(x) = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x \leq 0 \end{cases}$$

The domain is \mathbb{R} .