Discrete Structures

Functions

Chapter 1, Section 1.6

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Functions

◇ $f : A \rightarrow B$: A function from A to B is an assignment of exactly one element of B to each element of A.

  ◇ A is the domain of f and B is the codomain of f.

  ◇ If $f(a) = b$, we say that b is the image of a and a is a pre-image of b. The range of f i the set of all images of elements of A.

  ◇ f maps from A to B.

◇ $f_1 + f_2, f_1 f_2$: Let f_1 and f_2 be functions from A to R. Then
$(f_1 + f_2)(x) = f_1(x) + f_2(x),$
$(f_1 f_2)(x) = f_1(x) f_2(x)$

Functions

◇ **Injection:** Function f is said to be one-to-one, if and only if $f(x) = f(y)$ implies that $x = y$ for all x and y in the domain of f.

◇ Function f whose domain and codomain are subsets of the set of real numbers is called strictly increasing if $f(x) < f(y)$ whenever $x < y$ and x and y are in the domain of f (decreasing analogous).

◇ **Surjection:** Function f is said to be onto / surjective, if and only if for every element $b\epsilon B$ there is an element $a\epsilon A$ with $f(a) = b$.

◇ **Bijection:** Function f is a one-to-one correspondence, or bijection, if it is both one-to-one and onto.

◇ **Inverse function:** Let f be a one-to-one correspondence from A to B. The inverse function of f assigns to an element b in B the unique element a in A such that $f(a) = b$. The inverse function of f is denoted by f^-1. Hence, $f^-1(b) = a$ when $f(a) = b$.