

Notes 5

A function from set X to set Y

domain—set X ; co-domain—set Y ; range—a subset of Y .

Consider a function as arrows from elements in set X to elements in set Y .

“it is a **function**” means

“every element in X has an outgoing arrow
and no element in X has two or more outgoing arrows”

That is, **every** element in X has **exactly one** outgoing arrow.

range—the set of elements in Y that has one or more incoming arrows.

injective (one-to-one) functions, surjective (onto) functions, bijective functions (one-to-one correspondence).

we will just use “injective,” “surjective,” “bijective”---they are more commonly used they are all “functions,” so properties of functions above should be satisfied in all cases
additional properties:

injective functions (injections)

every element in Y has *at most* one incoming arrow.

(i.e., exactly one incoming arrow or no incoming arrow)

surjective functions (surjections)

every element in Y has *at least* one incoming arrow.

(i.e., no element in Y has no incoming arrow)

bijective functions (bijections)

both injective *and* surjective

i.e., every element in Y has *exactly* one incoming arrow.

inverse functions

intuitively, a “restore,” or an “undo” function

by the definition of “functions,” only a bijective function have inverse function.

function composition

$f(g(x))$ v.s. $g(f(x))$

exponential functions and logarithmic functions

math review