

1.1: Real Functions

A mathematical function, denoted f , takes an **input** x (which is also called an **argument**), and returns an **output** $f(x)$. For now, we consider the case where both x and $f(x)$ are real numbers. The set of possible inputs is the function's **domain**, and the set of possible outputs is the **range**.

Every function must have a well-defined output: for any x in the domain, $f(x)$ must be a specific, unambiguous number. In other words, a function must be either a one-to-one (injective) mapping or a many-to-one mapping; the mapping cannot be one-to-many or many-to-many:

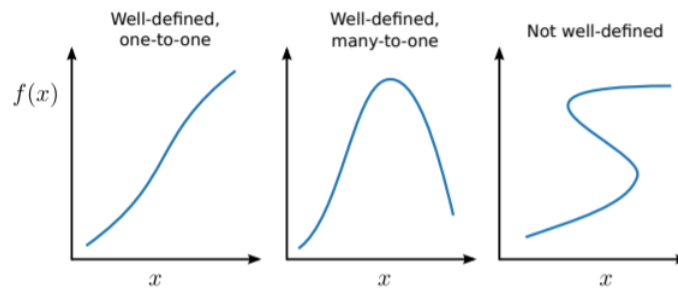


Figure 1.1.1

Simple examples of functions are those based on elementary algebra operations:

$$f(x) = x + 2 \quad (\text{a one-to-one function}) \quad (1.1.1)$$

$$f(x) = x^2 + 2x + 4 \quad (\text{a many-to-one function}) \quad (1.1.2)$$

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