

Injectons, Surjections, and Bijections

Arrow properties on a binary relation $R : A \rightarrow B$

A function R is a *function* when it has $[\leq 1 \text{ arrow out}]$ property.

Surjective R is *surjective* when it has the $[\geq 1 \text{ arrow in}]$ property. That is, every point in the righthand, codomain column has at least one arrow pointing to it.

Total R is *total* when it has $[\geq 1 \text{ arrow out}]$ property.

Injective R is *injective* when it has $[\leq 1 \text{ arrow in}]$ property. That is, every element of the codomain is mapped to by *at most* one element of the domain.

Bijjective R is *bijjective* when it has both the $[= 1 \text{ arrow out}]$ and the $[= 1 \text{ arrow in}]$ property.

Surjection

Injection An injective function is an *injection*. $\forall x, x' \in X, f(x) = f(x') \Rightarrow x = x'$

Bijection