Injective (1-1) and surjective (onto) functions

We introduce three fundamental properties that some functions have. These properties test your ability to work with quantifiers in a very fundamental way.

Injective functions

Definition (12.4 in the book): Let $f : A \to B$ be a function. Then

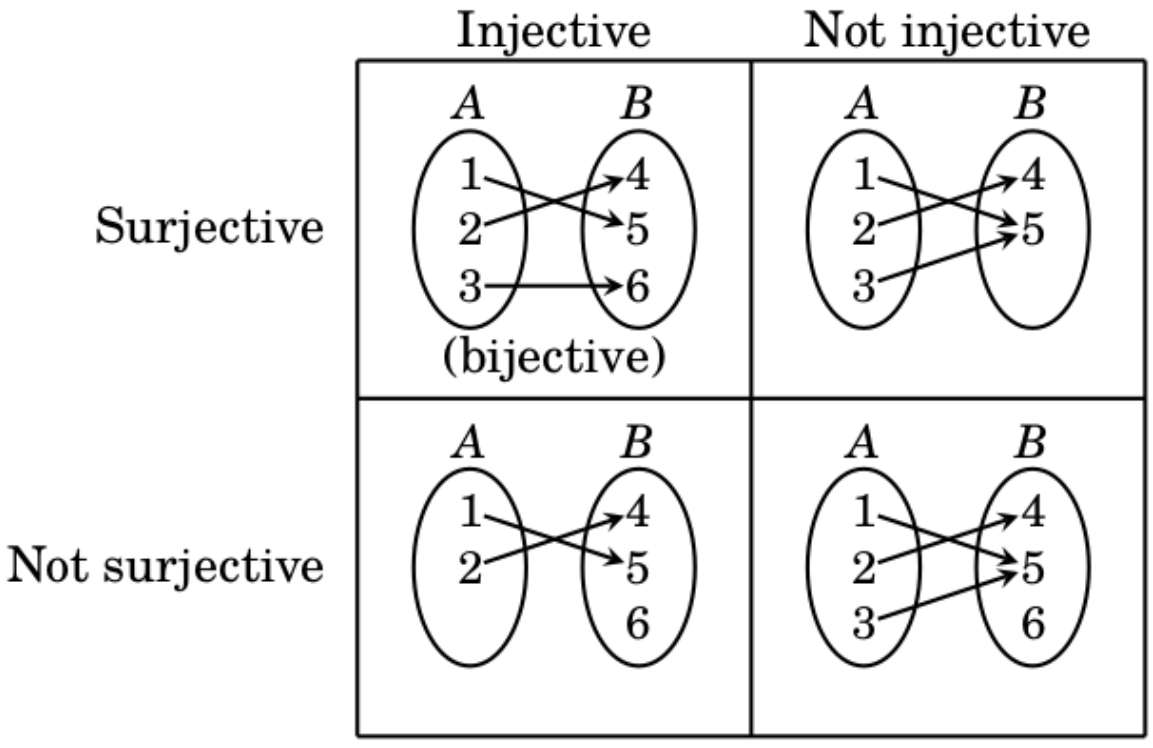
- f is called **injective** if, for all a, a' in A, if $a \neq a'$ then $f(a) \neq f(a')$. (Such f are also called "one-to-one" functions).

Surjective functions

- f is called **surjective** if, for all $b \in B$, there exists $a \in A$ such that $f(a) = b$. (such f are also called "onto" functions.)

Note: whether a function is surjective depends on its codomain. It is always surjective onto its range.

Picture from page 229



Bijective functions

- f is called **bijective** if it is both surjective and injective.

Injective functions