A *map* $f\colon X \to Y$ is a rule that associates to every element $x \in X$ a unique element of Y. The element associated to x is denoted by $f(x)$.
A map can be pictured as a collection of arrows going from elements of X to elements of Y. At every element of X one and only one arrow must start. By contrast, at an element of Y several arrows or none at all may end.

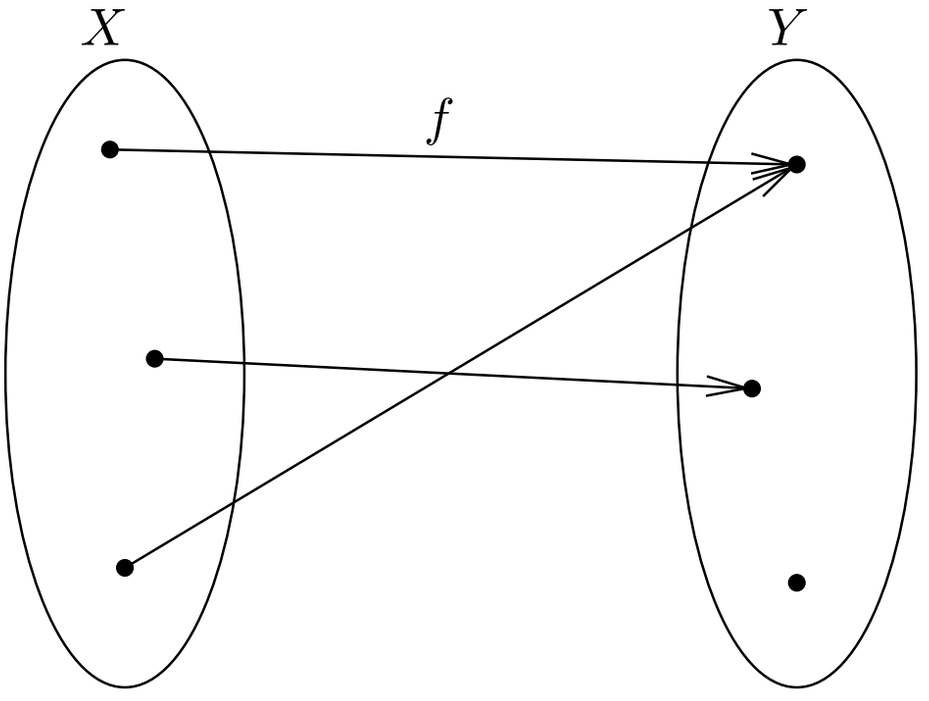

Figure 1: A map $f\colon X \to Y$.

A map $f\colon X \to Y$ is called

- *injective*, if no two different elements of X are sent to the same element of Y: for every $x_1 \neq x_2$ we have $f(x_1) \neq f(x_2)$;
- *surjective*, if to every element of Y some element of X is sent: for every $y \in Y$ there is $x \in X$ such that $f(x) = y$;
- *bijective*, if it is injective and surjective.