

# Regular expressions

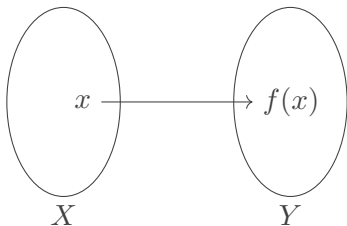
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ian.mcloughlin@gmit.ie

# Functions

## Definition

Suppose that  $X$  and  $Y$  are sets. We say we have a function  $f$  from  $X$  to  $Y$  if for each  $x$  in  $X$  we can specify a unique element in  $Y$ , which we denote by  $f(x)$ .

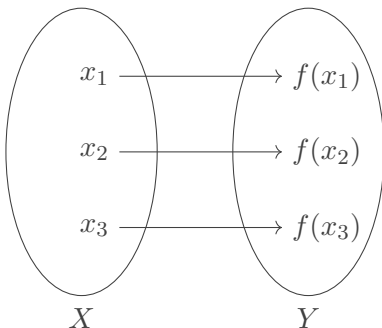


# Bijections

## Definition

A bijection is function  $f$  from a set  $X$  to a set  $Y$  where both of the following are true:

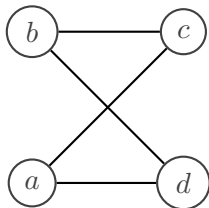
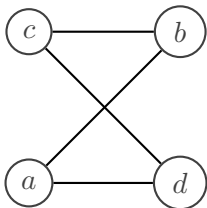
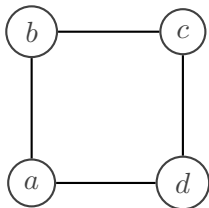
- every  $y$  in  $Y$  is a value  $f(x)$  for at most one  $x$  in  $X$ .
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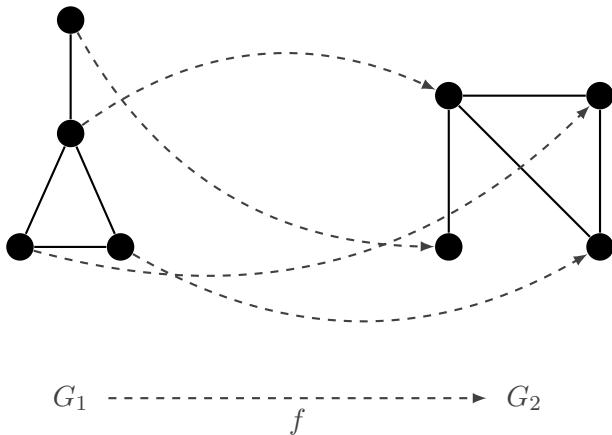
# Isomorphism

## Definition

Two graphs  $G_1$  and  $G_2$  are said to be isomorphic when there is a bijection  $\alpha$  for the vertex set  $V_1$  of  $G_1$  to the vertex set  $V_2$  of  $G_2$  such that  $\{\alpha(x), \alpha(y)\}$  is an edge of  $G_2$  if and only if  $(x, y)$  is an edge of  $G_1$ .



## Isomorphism example



## Isomorphism: degrees

### Exercise

Determine if these two graphs are isomorphic.

