



### Why

If  $x$  is related to  $y$ , the  $y$  is related to  $x$ , but how?

### Definition

If  $R$  is a relation between  $X$  and  $Y$ , then the *converse* or *inverse* relation of  $R$  is a relation on  $Y$  and  $X$  relating  $y \in Y$  to  $x \in X$  if and only if  $x R y$ . If  $R = R^{-1}$  then  $R$  is symmetric.

### Notation

We denote the converse relation of  $R$  by  $R^{-1}$ .

### Example

Let  $X$  be the set of people and let  $R$  be a relation in  $X$ . If  $R$  is “is a father of”, then  $R^{-1}$  is “is a son of”. If  $R$  is “is a mother of”, then  $R^{-1}$  is “is a daughter of”. If  $R$  is “is a brother of”, then  $R^{-1}$  is “is a brother of”. The relation “is a brother of” is symmetric.



