

### Example to remember Cartesian Product:

Example: Let  $A = \{a, b, c\}$  and  $B = \{p, q\}$ .

Then  $A \times B = \{(a, p), (a, q), (b, p), (b, q), (c, p), (c, q)\}$

Also  $B \times A = \{(p, a), (p, b), (p, c), (q, a), (q, b), (q, c)\}$

### Results on Cartesian Product:

If  $A$  and  $B$  are non-empty sets and either  $A$  or  $B$  is an infinite set, then so is  $A \times B$ .

$A \times A \times A = \{(a, b, c) : a, b, c \in A\}$ . Here  $(a, b, c)$  is called an ordered triplet.

Important definitions to remember related with Relations:

Let  $A$  and  $B$  are two sets. In domain, co-domain and range of a relation, if  $R$  be a relation from  $A$  to  $B$  then

Domain of relation  $R$  ( $\text{Dom}(R)$ ) is the set of all those elements  $a \in A$  such that  $(a, b) \in R$  for some  $b \in B$ .

If  $R$  be a relation from  $A$  to  $B$ , then  $B$  is the co-domain of  $R$ .

Range of relation  $R$  is the set of all those elements  $b \in B$  such that  $(a, b) \in R$  for some  $a \in A$ .

In short: Domain =  $\text{Dom}(R) = \{a : (a, b) \in R\}$  and Range  
( $R$ ) =  $\{b : (a, b) \in R\}$

Note: Range is always a subset of co-domain.