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cartesian product is not commutative. As per the properties of the cartesian product, the result depends on the order of the sets. Consider the two sets C and D:  $C \times D \neq D \times C$ . But,  $C \times D = D \times C$ , if and only if  $C = D$ . If  $C = \{11,12,13\}$  and  $D = \{7, 8\}$ , then:  $C \times D$  will be:  $\{(11,7), (11,8),(12,7),(12,8),(13,7),(13,8)\}$ .  $D \times C = \{(7,11),(7,12),(7,13),(8,11), (8,12),(8,13)\}$ . What Is The Cartesian Product Of Relations? The cartesian product of relations does not exist because the relations itself is an ordered pair, which relates the elements of one set with the elements of another set. Relations in maths is another form of connecting the elements of two sets, similar to the cartesian product of sets. Does Order Matter in Cartesian Product? Yes, the order in which the sets are multiplied in a cartesian product matters as the cartesian product is not commutative. The cartesian product does not satisfy the commutative property. Two sets A and B are such that, the cartesian product  $A \times B$  will not be equal to the cartesian product  $B \times A$ .  $A \times B \neq B \times A$  What Is the Cartesian Product of Two Empty Sets? The cartesian product of two empty sets will also be an empty set. As per the properties of the cartesian product, consider two sets A and D, such that  $A \times D = \emptyset$  if either  $A = \emptyset$  or  $D = \emptyset$ . Also, if both the sets are empty sets, then the resulting cartesian product will also be empty. How Do You Find the Cardinality of a product? The cardinality of a set is the total number of elements in the set. The cardinality of a cartesian product of two sets C and D is equal to the product of the cardinalities of these two sets:  $n(C \times D) = n(D \times C) = n(C) \times n(D)$ . Consider two sets  $A = \{2,5\}$  and  $C = \{4,1\}$ . The cardinality of A and C are 2 and 2. Hence, the cardinality of their product will be  $n(A \times C) = n(A) \times n(C) = 2 \times 2 = 4$ . Is Cartesian Product an Equivalence Relation? A cartesian product is an equivalence relation if and only if the cartesian product is a product of a set with itself. An equivalence relation is a relation that is reflexive, symmetric, and transitive.

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