NPTEL
NPTEL ONLINE COURSE
Discrete Mathematics
Relations
Cartesian Product
With
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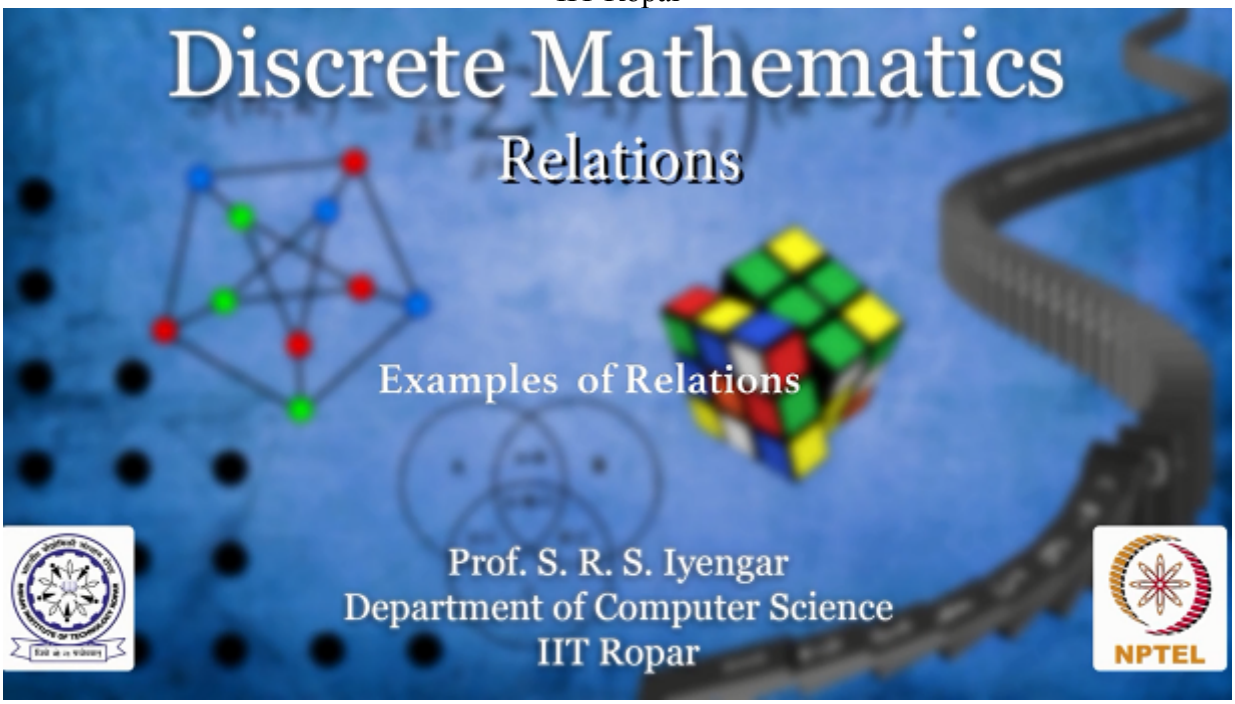
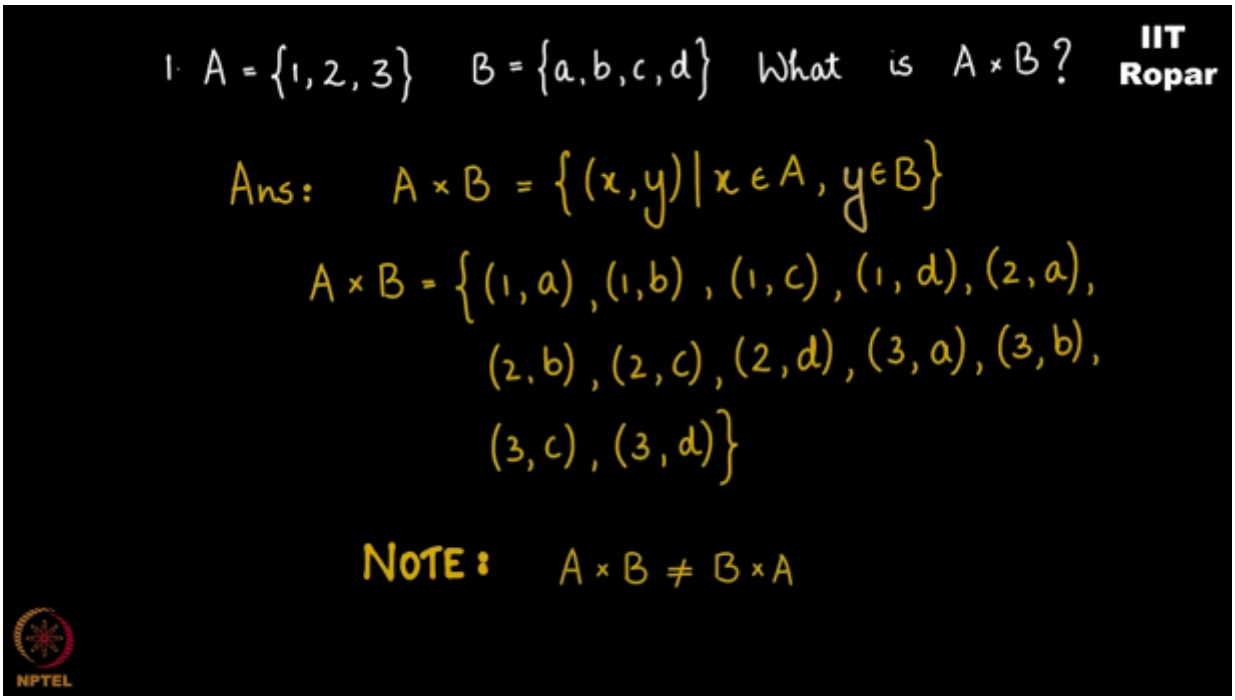
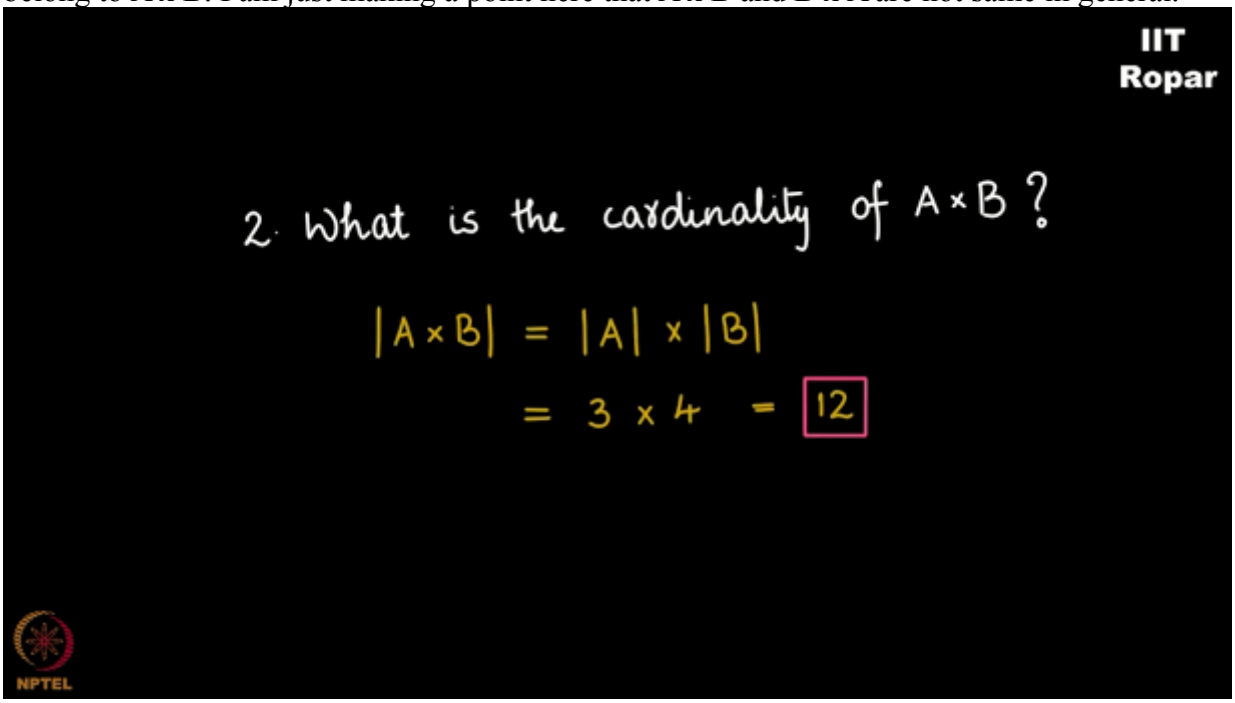


You're now familiar with Cartesian product and donations, let us now see some problems on it.

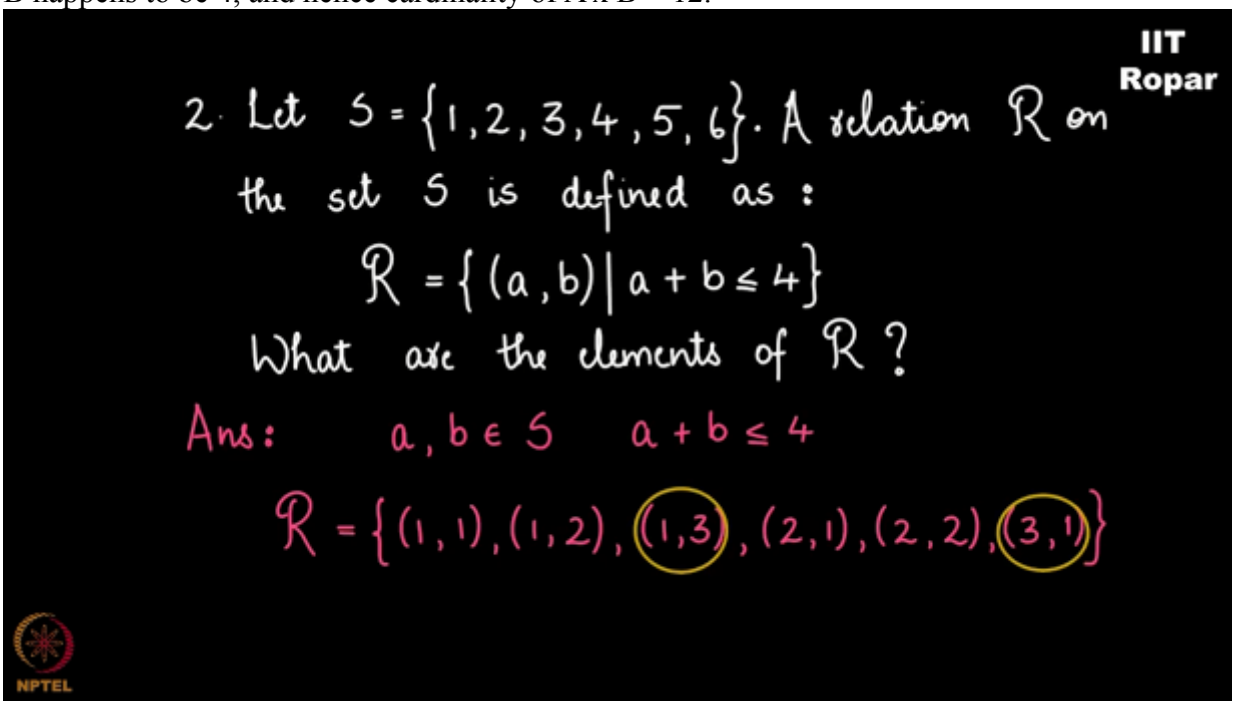


Consider this set A {1, 2, 3} and B = (a, b, c, d}. The question is what is A x B. It's a very straightforward question. A x B will have the elements, I am going to take one element from A and B and I am going to follow this procedure for all the elements of A and B. So what will A x B look like? A x B looks like {(x, y)| x € A and y € B}. So A x B will be {(1, a), (1, b), (1, c), (1, d), (2,a), (2, b), (2, c), (2, d) , (3, a), (3, b), (3, c), (3, d)}. So all these are the elements of A x B.

Please note A x B is not equal to B x A. You see here (1, a) belong to A x B, but (a, 1) does not belong to A x B. I am just making a point here that A x B and B x A are not same in general.



So what is going to be the cardinality of A x B? So to find the cardinality of A x B, we use the formula that is equal to cardinality of A x cardinality of B. Cardinality of A happens to be 3 and B happens to be 4, and hence cardinality of A x B = 12.



The next question: Consider the set S having the elements 1, 2, 3, 4, 5, 6. Now, to define the relation R on the set S as {(a, b) | a + b ≤ 4. So what are the elements in this relation are. So the relation R has elements, which satisfied this condition a +b ≤ 4. Now, so it will precisely have (1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (3, 1). Please note (1, 3) and (3, 1) are not the same, as illustrated in the first question, and hence, they are to be returned as tow different elements. So that is it. These are the elements in the relation R.