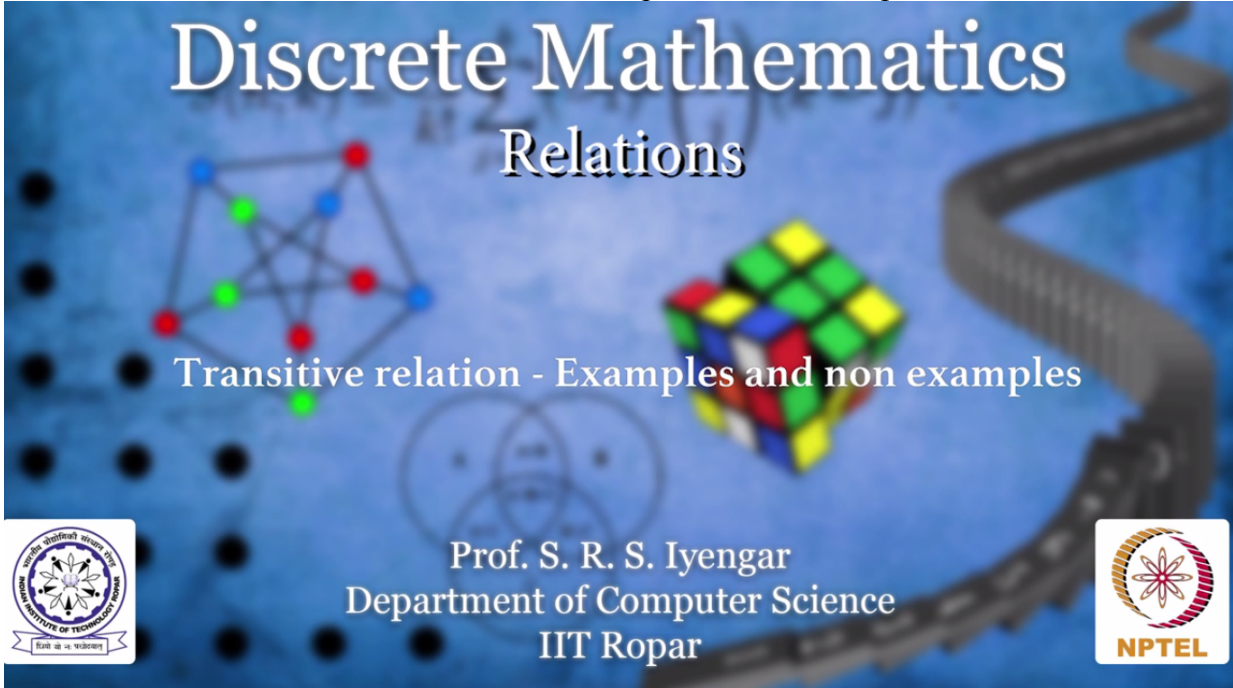


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Discrete Mathematics  
Logic



Transitive relation - Examples and non examples



**Discrete Mathematics**  
**Relations**

Transitive relation - Examples and non examples

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Let us take an example. Consider a hall full of 50 students and the relation there is  $A, B$  belongs to  $R$  if  $A$  is taller than  $B$ . you can observe something nice in this relation which is not always true with all relations and that is whenever  $A$  is taller than  $B$  and  $B$  is taller than  $C$  then  $A$  is taller than  $C$ . Correct. By that I mean if  $A, B$  belongs to  $R$  and  $B, C$  belongs to  $R$  then  $A, C$  belongs to  $R$ . Very easy to observe. I repeat  $A, B$  if it's in the relation  $B, C$  if it's in the relation then  $A, C$  is in the relation. If this be the case then you call such a relation as a transitive relation.

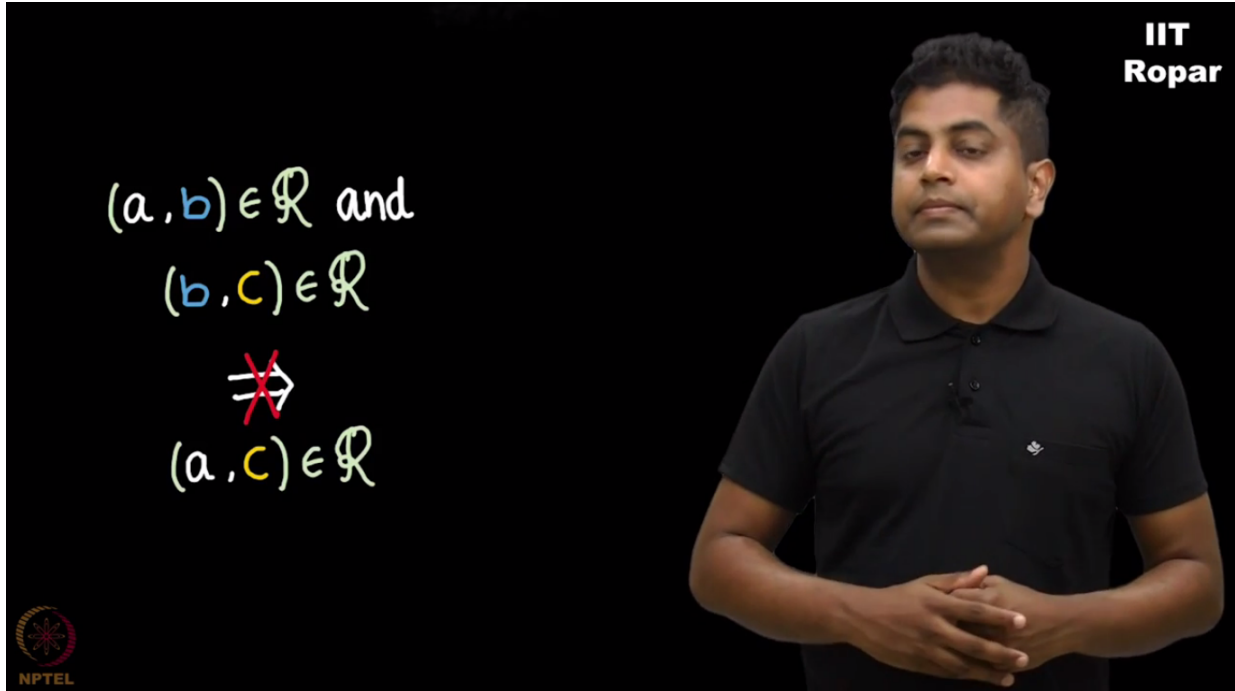
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If  $(a, b) \in \mathcal{R}$  and  
 $(b, c) \in \mathcal{R}$ , then  
 $(a, c) \in \mathcal{R}$

TRANSITIVE  
RELATION

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You see not every relation is transitive. I'll try giving you an example of a relation that is not at all transitive. I shake my hands with you and you shake your hands with your friend. It doesn't mean that I have shaken hands with your friend right. So A shakes hand with B so  $(A, B) \in \mathcal{R}$  if that be the relation and if B, C have shaken hands observe this is a symmetric relation. If  $(A, B) \in \mathcal{R}$  then  $(B, A) \in \mathcal{R}$  but then it is in no way transitive because  $(A, B) \in \mathcal{R}$  and  $(B, C) \in \mathcal{R}$  doesn't imply  $(A, C) \in \mathcal{R}$  belongs to the relation right.



So I just now gave you an example of a relation that is not transitive. So not all relations are transitive. Only some relations are transitive. Can you think of more relations that are transitive?

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