NPTEL

NPTEL ONLINE CERTIFICATION COURSE

Discrete Mathematics
Set Theory

Connection between Binomial Theorem
And Power Sets

With
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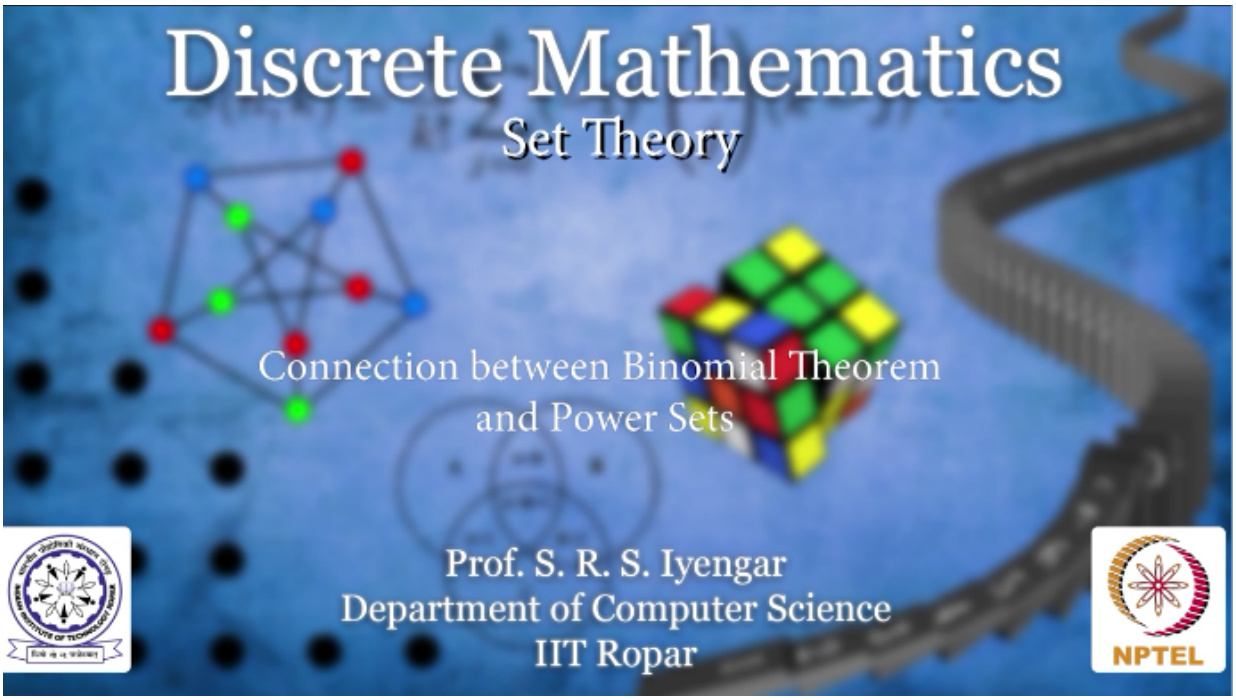
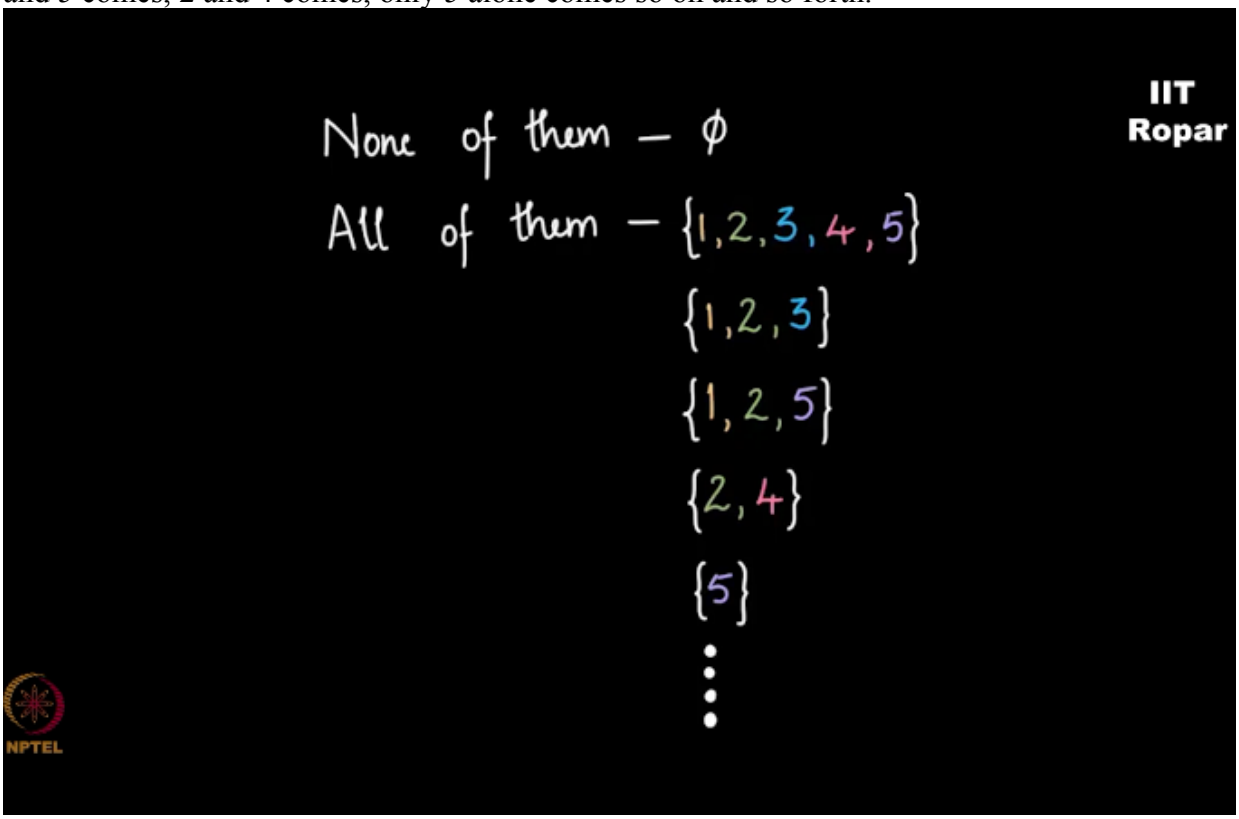
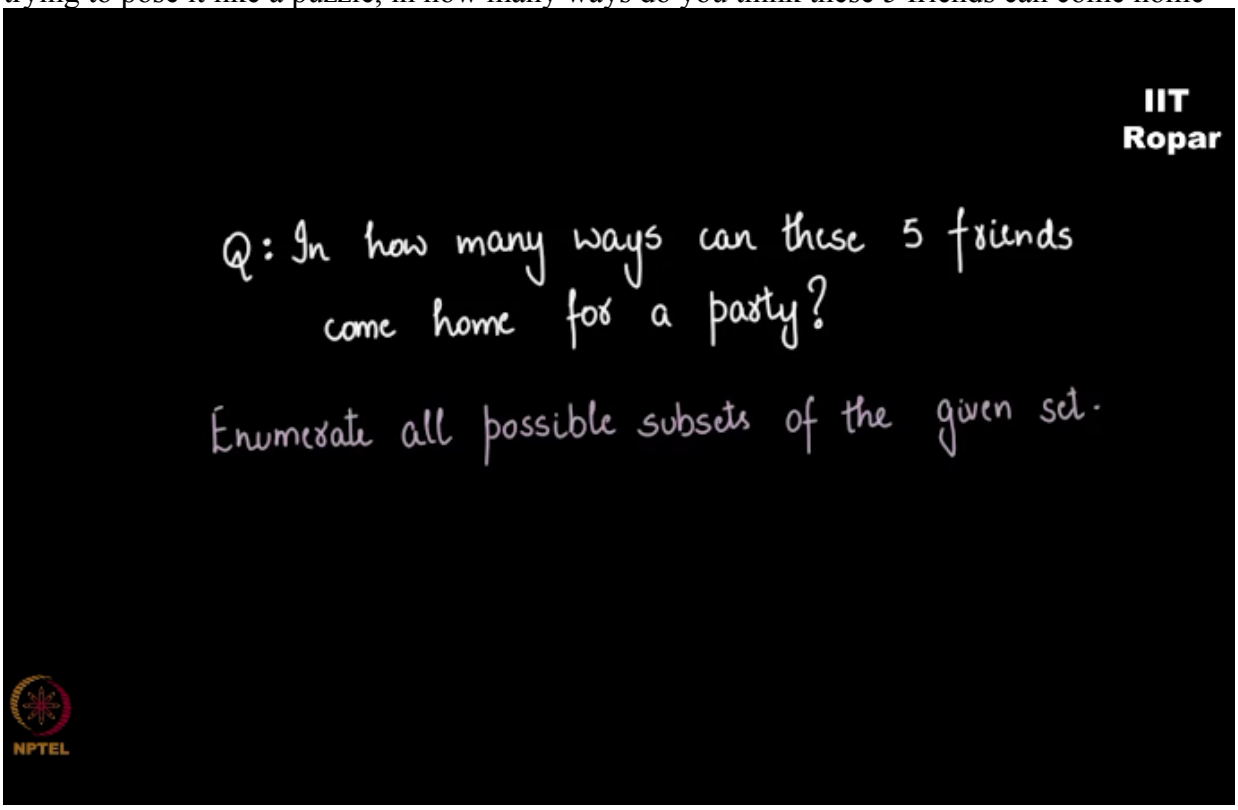


All right, so I throw a party to my 5 friends, let me call these 5 friends as 1, 2, 3, 4, 5, now these 5 people are not very punctual you know they say they will come for the party and they don't show up, it might so happen that all 5 of them come, or it might so happen that none of them come.

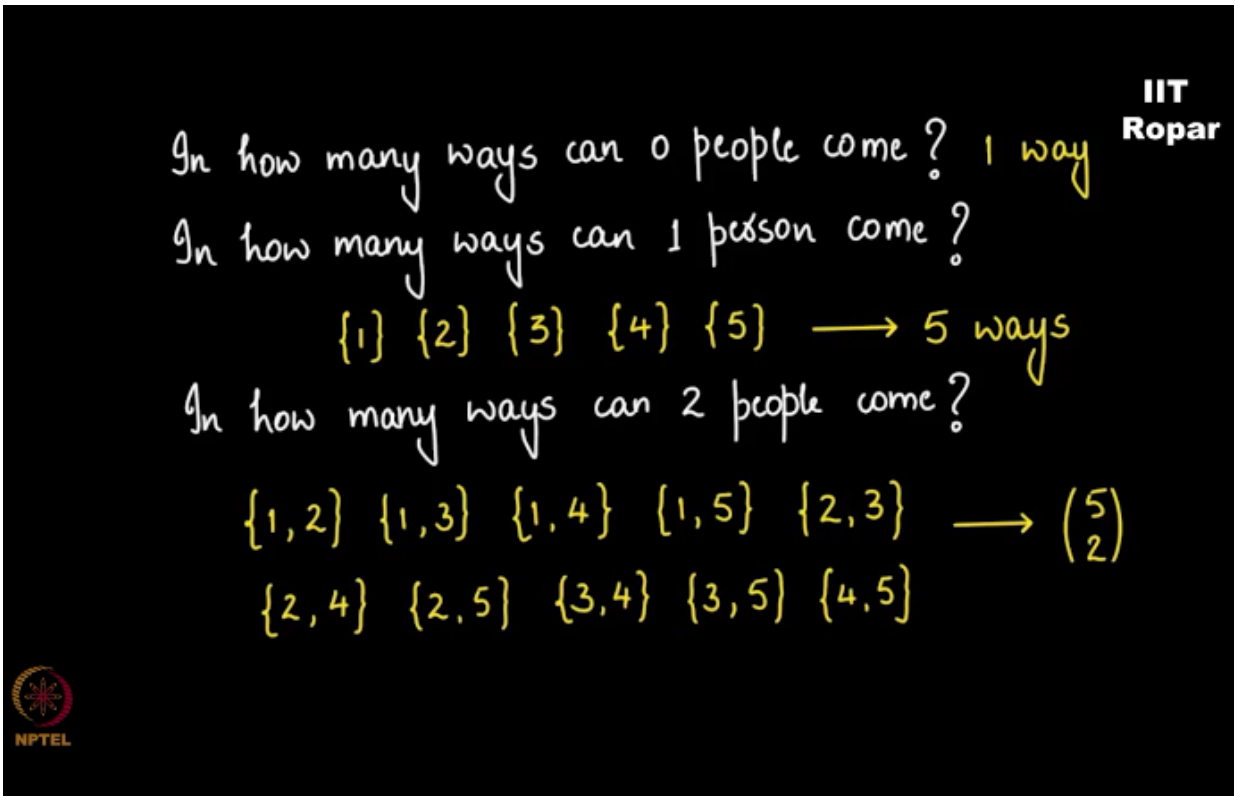
Let me think of all possibilities, none of them come I represent it by an empty set, all of them come I will represent it by 1, 2, 3, 4, 5 set, only 1, 2, 3 comes I will represent it like this, 1, 2, and 5 comes, 2 and 4 comes, only 5 alone comes so on and so forth.



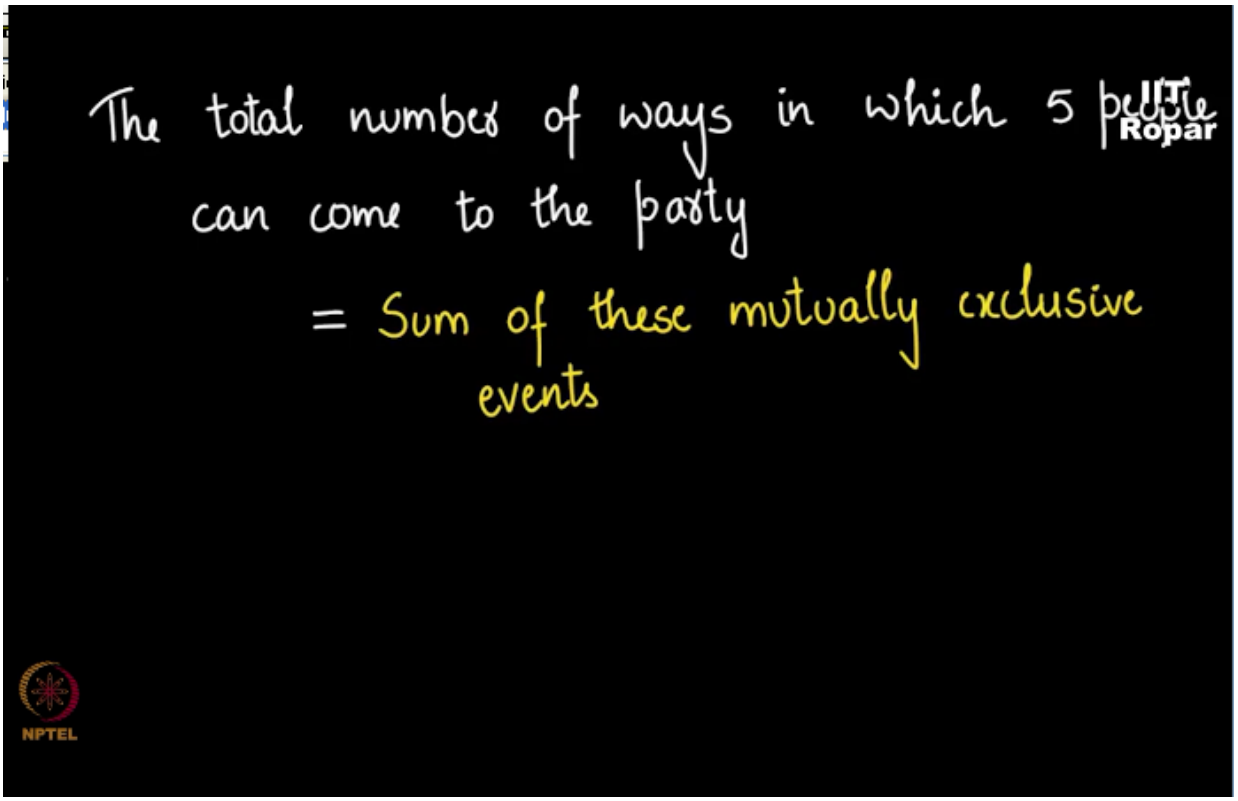
Now my question would be we have asked this question already it's a standard question I'm just trying to pose it like a puzzle, in how many ways do you think these 5 friends can come home



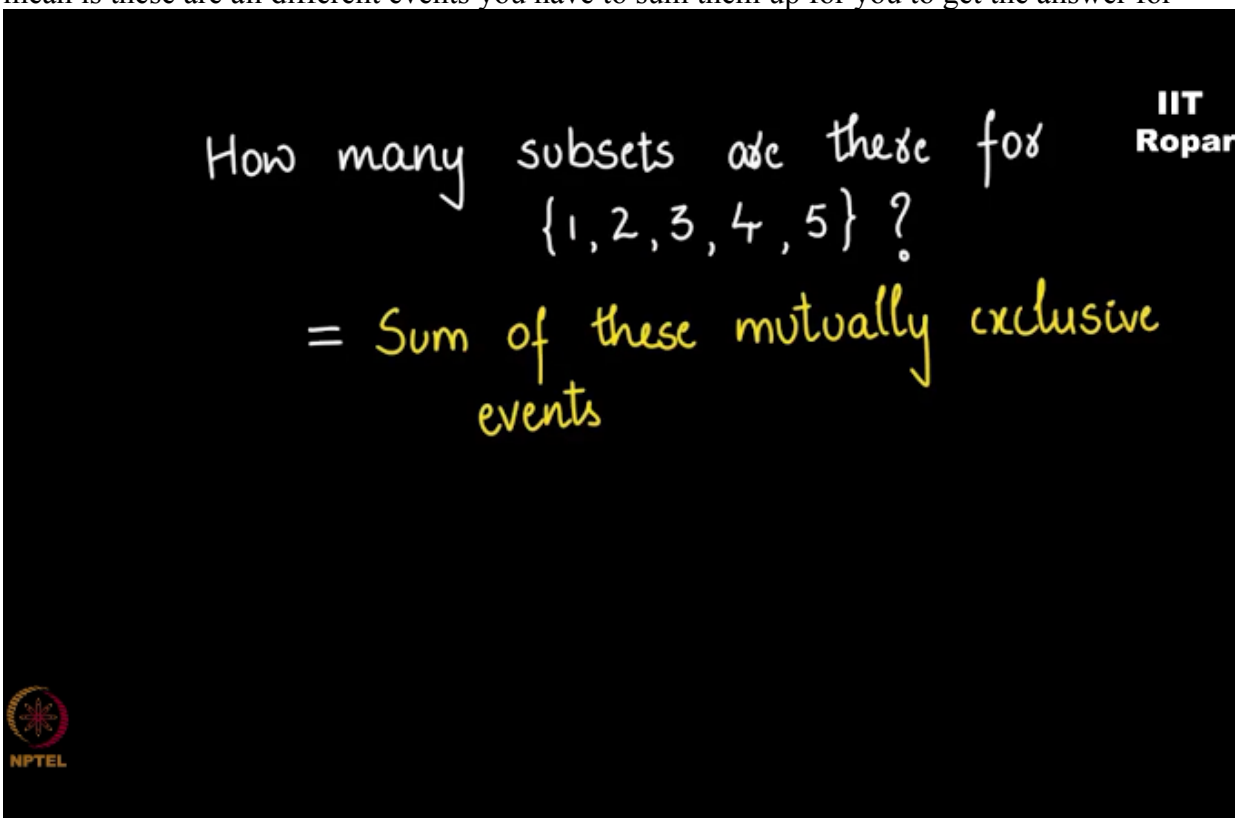
for a party, so it's about enumerating all possible subsets of a given set, so in how many ways can 0 people come? One way, in how many ways can one person come? That is singleton one, singleton 2, singleton 3, singleton 4, singleton 5, five ways. In how many ways can 2 people come? 1 2, 1 3, 1 4, 1 5, 2 3, 2 4, 2 5, 3 4 & 4 5, don't you think this is same as 5 choose to all possible ways in which you can pick 2 elements from 5 elements, don't you think the previous one which we simply wrote as 5 was actually 5 choose 1, in how many ways can you pick one person out of 5 people?



Don't you think this 1 which corresponded to the empty set was actually 5 choose 0, in how many ways can you choose 0 elements from 5 elements? Going ahead the total number of ways in which 3 people can come to the party will actually be 5 choose 3, 4 people coming to the party will be 5 choose for 4, 5 people coming to the party will simply be 5 chose 5 one-way, so that total number of ways in which these 5 people can come to the party is the sum total of these mutually exclusive things, mutually exclusive sounds a little complicated, by that all I

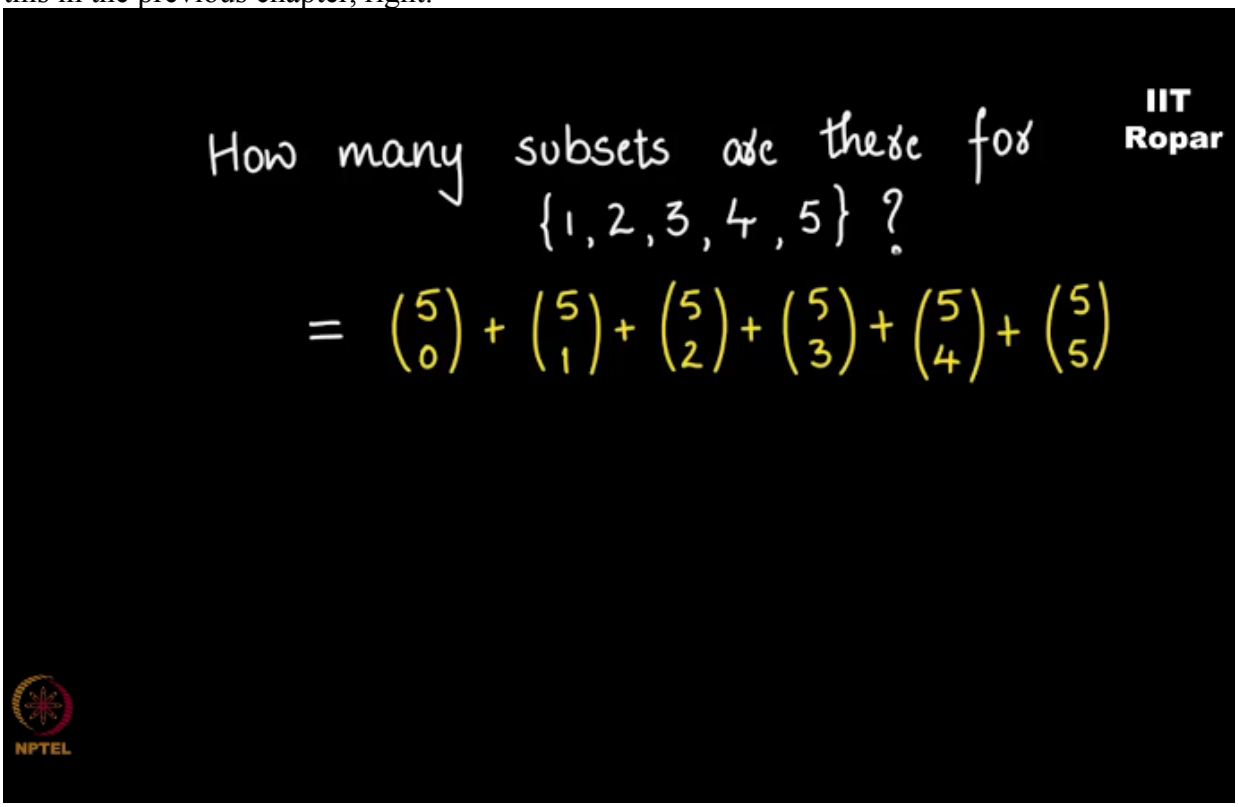


mean is these are all different events you have to sum them up for you to get the answer for

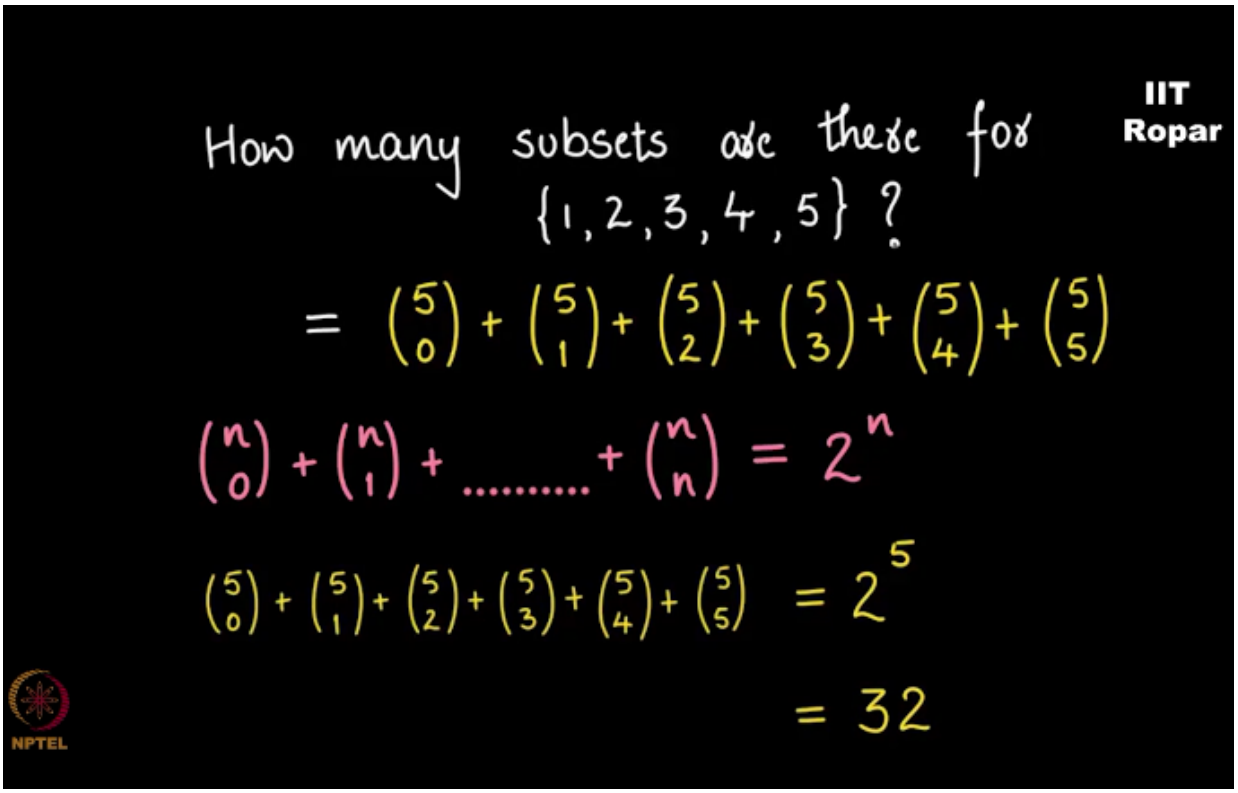


your question which is how many possible subsets are there of 1, 2, 3, 4, 5, so 5 choose 0 + 5 choose 1 + 5 choose 2 + 5 choose 3 + 5 choose 4 + 5 choose 5 is the answer, now should I

expand this and do a lot of work and then say what's the answer? Not required, we have seen this in the previous chapter, right.



In general N choose 0 + N choose 1 + up to N choose N is actually 2 to the N, if you don't know this is the right time for you to revise this see how this is true right let's apply that here and simply say this is going to be 2 to the power of 5 which is 32 and that's the answer.



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