Discrete Mathematics

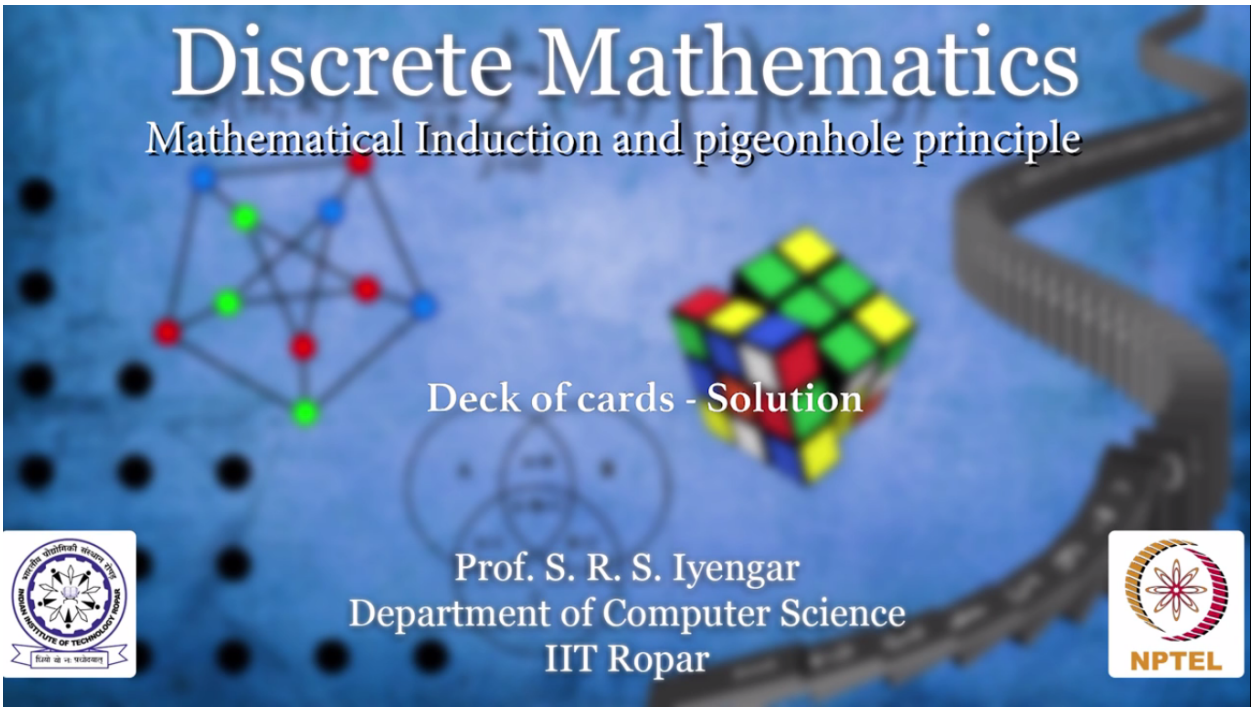
Functions

Deck of cards - Solution

Prof S.R.S. Iyengar

Department of Computer Science

IIT Ropar

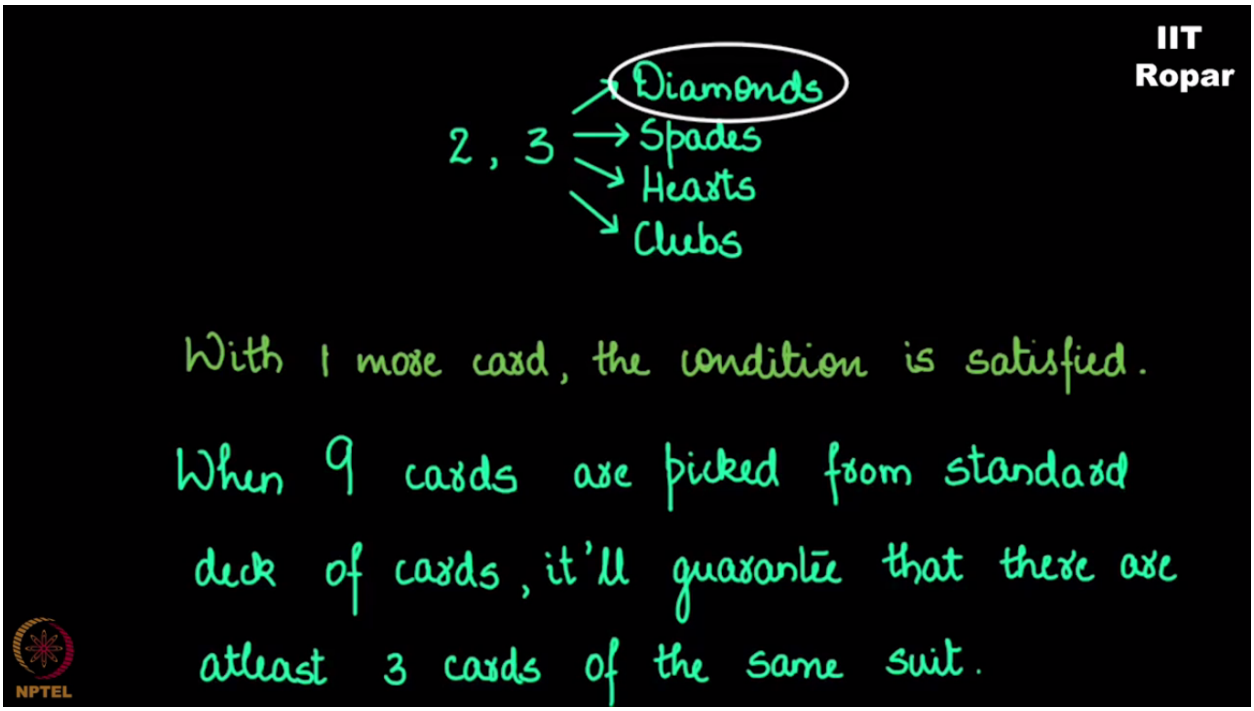


So the answer goes like this. You have a standard deck of cards that is you have 52 cards given and there are four suits right. Now I am going to call these four suits as four pigeonholes okay.

Now I have to pick certain number of cards. Let me call that as n. Now if I have to pick n numbers cards I have to see to it that I pick three, at least three cards of the same suit. Now what if I pick one card some each pigeonhole? So what does it give me? It just gives me that I have picked one from each suit. Does this satisfy to my condition? No. What if I pick two cards from every pigeonhole? Now please note these cards are our pigeons and the suits are pigeonholes. Clear.

Now picking two cards from each suit gives me 2 plus 2 plus 2 plus 2 which is 8 cards right and 2 from each suit it is. Now does this satisfy the condition? Still no. Why? Because I do not have at least three cards from one particular suit. For an example if I pick the cards 2, 3 from Diamonds, the card with number 2, the card with number 3 on Diamonds, on Spades, on Hearts, and Clubs. I pick the same 2, 2, 2 from each of them I still do not end up having that number where at least three cards are of the same suit.

Now the moment I pick one more card just one, one more card I will definitely end up having three cards from one suit. I hope it is very clear with this. Suppose say I will go back to the same example. I have picked the card 2 and the card 3 from Diamond, if I pick just one card say from Diamond itself then I am done and this holds for all the four suits. So 9 is that number where 9 cards will do the magic of satisfying this condition.



When I pick 9 cards from the standard deck of cards it will give me at least three, it will guarantee that I will end up having at least three cards of the same suit.