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NPTEL ONLINE COURSE

Discrete Mathematics

Let Us Count

Proof of $n!$ - Part 1

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What did you just now see? You saw that one person could take a picture in precisely one way. Now that was a very boring case. Right? There is nothing interesting there because you can probably take another picture in a different location. That is what going to change the picture. But then imagine two people taking this photo. They can take this photo in two different ways. Right? Two. How about three people? Let's say A, B and C. Let's see in how many ways they can take the picture. So how do we solve this question? The question is this; there are these three people A, B, C in how many ways can you arrange them and take a picture each of these three people? Right? One way would be ABC in this order. The other way would be A remains in the same place while C and B swap their locations. Now they are done. This is the second option. The third one would be and just repeating what we saw in the video, because I am interested right now in coming on with a formula given n people. Given three people A, B, C, A, C, B and then let's say B in the first place, A and C in the second and third place. Next again, B as it is and A, C swapped. Then finally C here, A, B here and the last option would be C, B, A.

Now my question is have we exhausted all the possibilities? Probably yes. How about you are sure that you have not left out a possibility that's because we went step by step. We saw all possible ways in which A in the first place can take pictures. B in the first place can take pictures. C in the first place can take pictures. Right. There is no way we would have left out a possibility here. So there are six possibilities as you can see. Correct. Perfect.

Now how about doing this for four things, A, B, C and D? Let us see.

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