**NPTEL**
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# Discrete Mathematics
## Mathematical Induction and Pigeonhole principle

### Three stories

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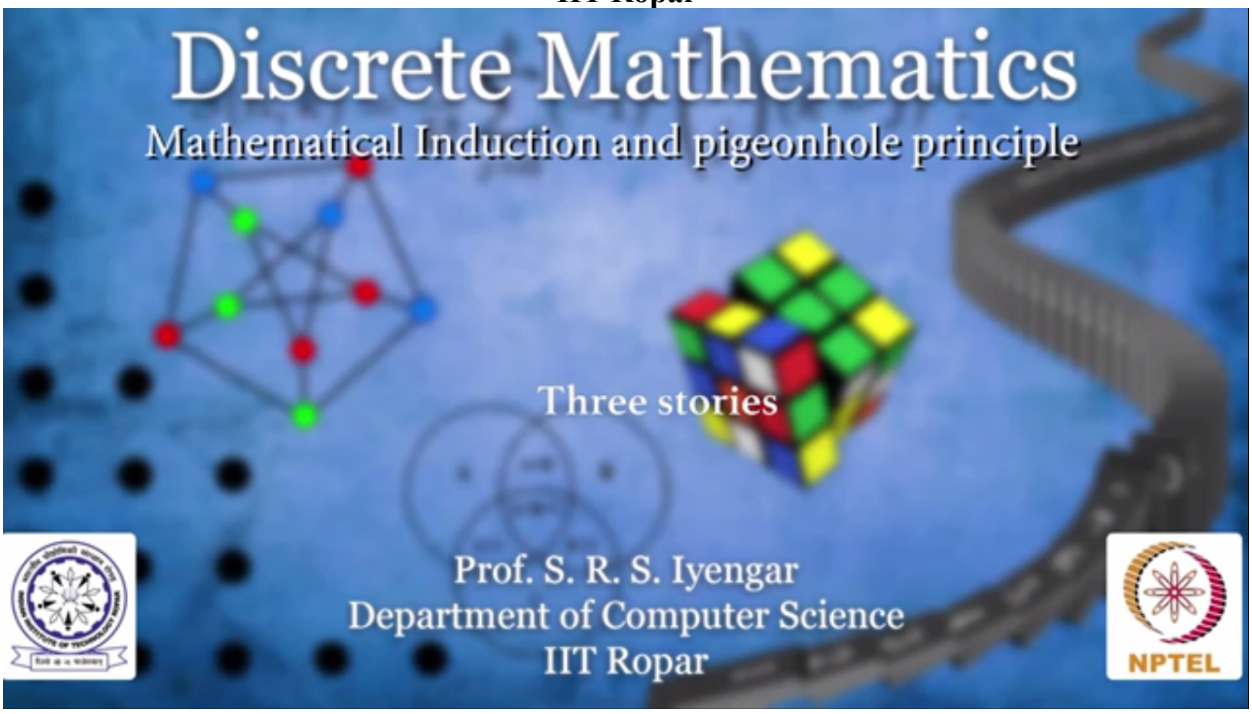

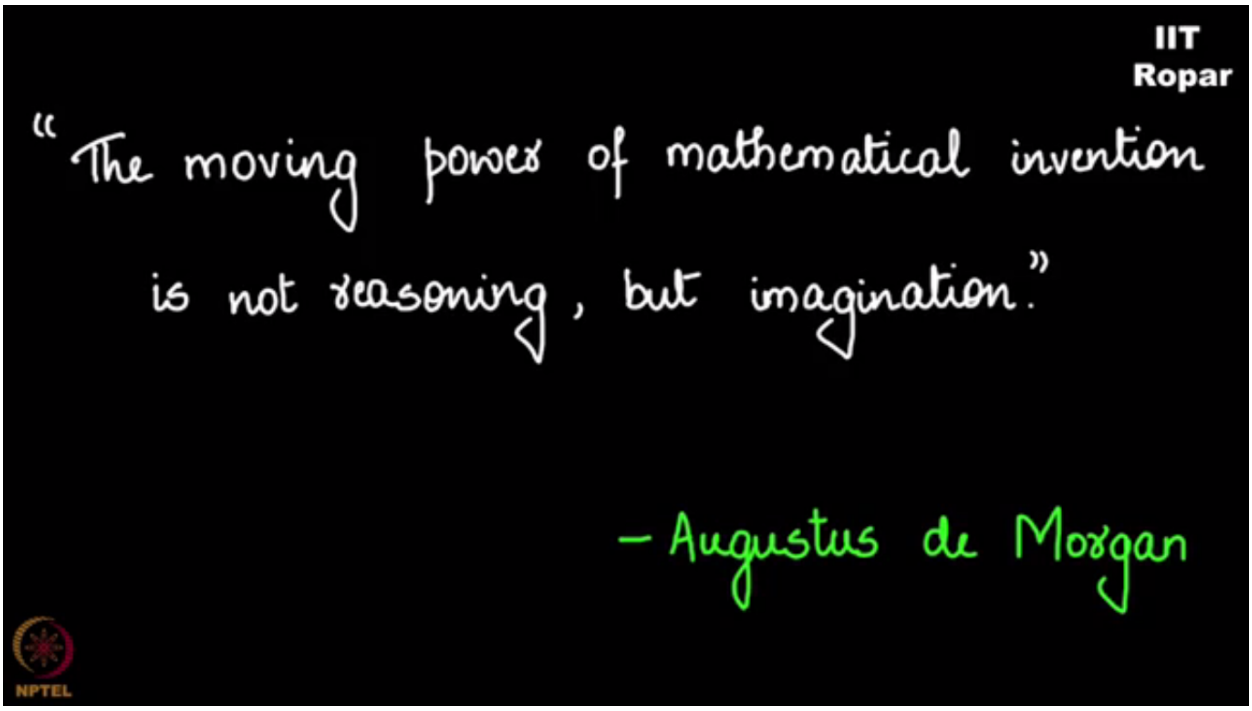


There is this city where majority of the people living are alcoholics. Assume a small story. Majority of them are alcoholics. It is becoming more like an epidemic and people don't know how to solve this problem, and there comes a leader and he comes out with a nice protocol. He comes and says, "I will pick one of you and cure you completely of your addiction and you must pay me your share of fees and that fee is going to be you must do exactly what I did to you. Show a lot of love, compassion, and care and ensure that you go and make another alcoholic recover from his addiction and take the same promise from him and so on." Can you see what exactly is a protocol here?

Second example. Assume you are placing wooden blocks one next to the other in such a way that if the first one is disturbed, it disturbs just the second one. Second one is disturbed; disturbs the third one, fourth one, fifth one. In general, any wooden block when disturbed disturbs the next wooden block.

What can you guarantee? You can guarantee that when you disturb the first wooden block, everything gets disturbed until the end, right? Out of this high school question, $1 + 2 + 3 + 4$ up to n is $n(n+1)/2$. We have seen this again and again and I'm sure you have your own favorite proof. If you don't know, it's time for you to pause the video and take a look at the proof.

My question is, why am I using this as a third example? What is the connection between the first one, second one and the third one? Think.

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