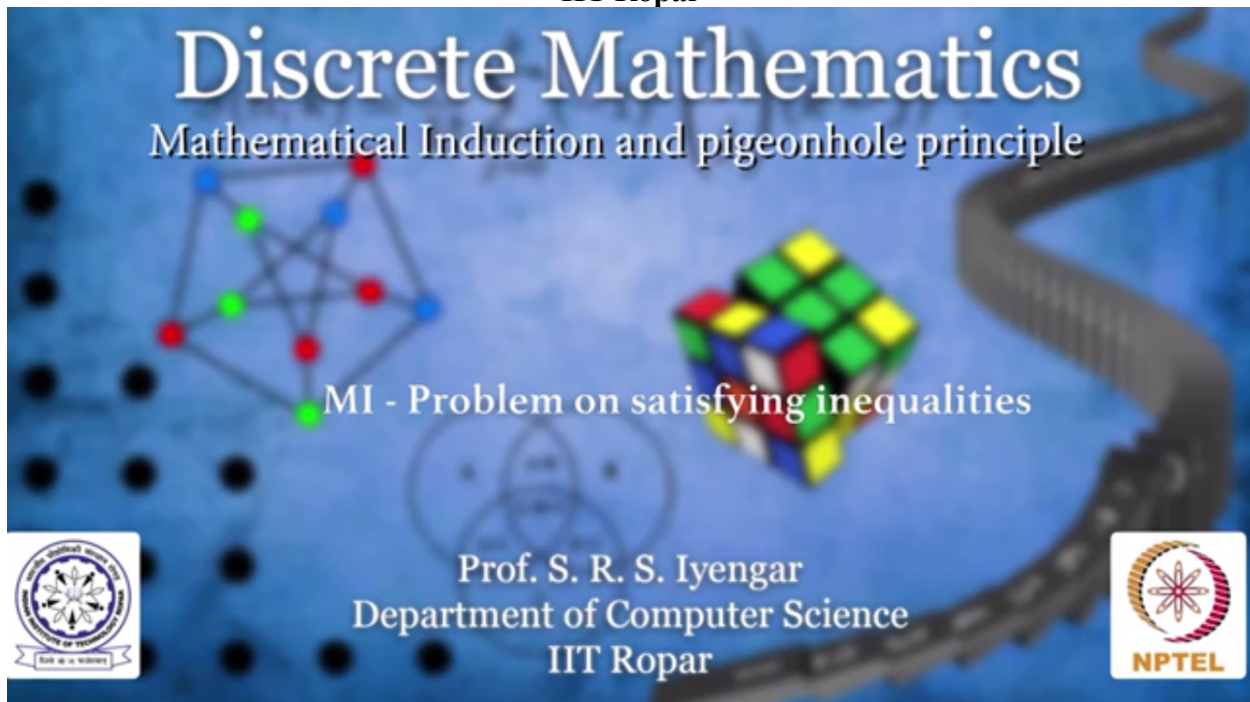


**NPTEL  
NPTEL ONLINE COURSE**

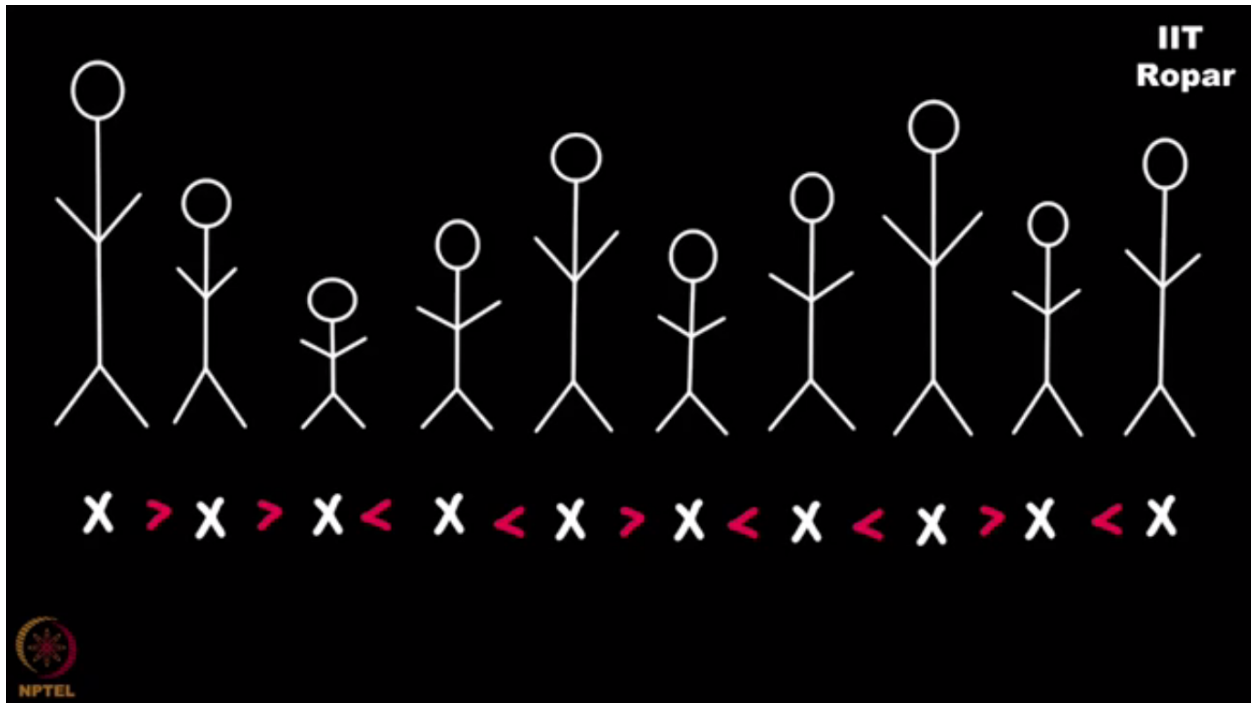
**Discrete Mathematics  
Mathematical Induction and pigeonhole principle**

**MI - Problem on satisfying inequalities**

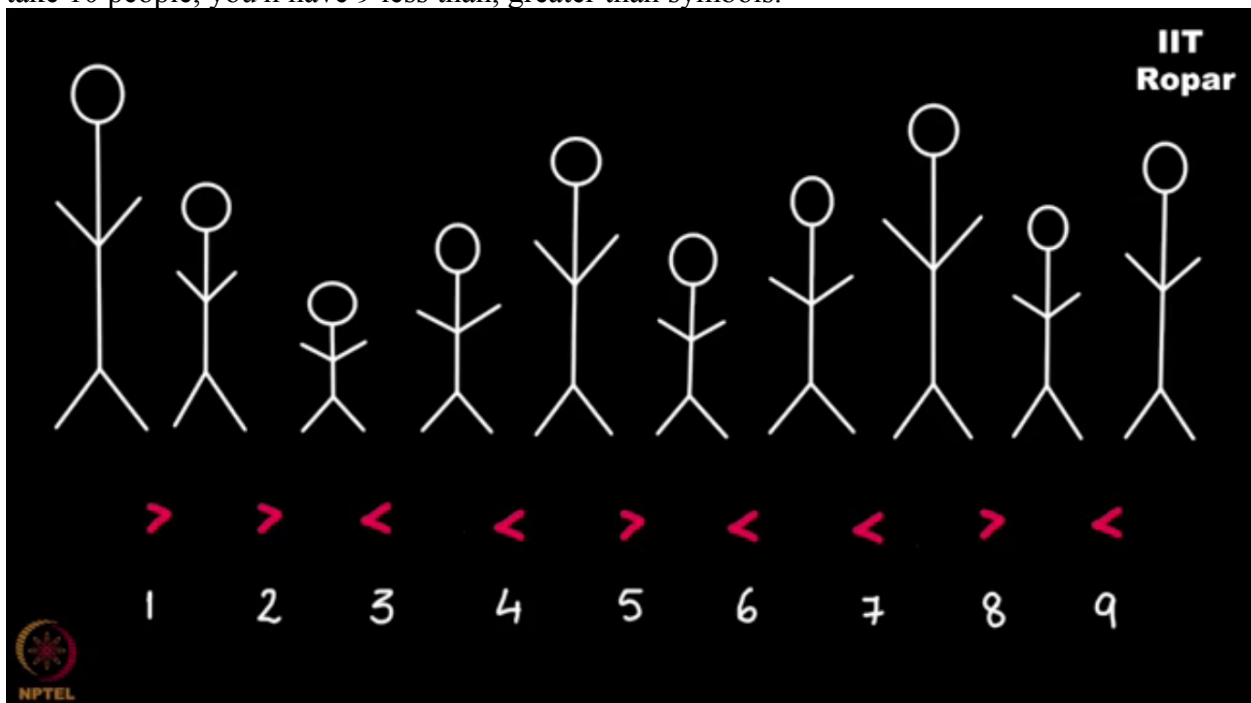
**Prof. S. R. S. Iyengar  
Department of Computer Science  
IIT Ropar**



Look at the following 10 people. You see they are of different heights. The first one is taller than the second one is taller than the third one, but third one is shorter than the fourth one is shorter than the fifth one. Fifth one is taller than the sixth one and so on. You see.



Now if I were to write down their heights, you will see these interspersed greater than or less than symbols between them. Now remove all these people and only look at these less than, greater than symbols. How many are there? Let us count. 1, 2, 3, 4, 5, 6, 7, 8, 9 of them. If you take 10 people, you'll have 9 less than, greater than symbols.



Now given a bunch of 10 people standing in some order, we could get this greater than, less than symbol. Now given these greater than, less than symbols, can you have these 10 people stand in that order such that these less than, greater than symbols are respected?

Now look at this sequence of greater than, less than. Can you make people stand in such a way that this is true? Is it possible?

Now the actual question is given numbers 1 to 10, you can look at this. This is one such way of writing 1 to 10. You have less than, greater than symbols like this. If I were to write it in some other way, you will get some other sequence.

Given numbers 1 to 10,

10 > 9 > 3 < 7 < 8 > 5 < 6 > 4 > 1 < 2

IIT Ropar

NPTEL

Now my question is the reverse of it. If you are given less than, greater than symbols in some sequence, can you write numbers 1, 2, 3 up to 10 which respects this particular sequence of less than, greater than symbols?

**IIT  
Ropar**

Given numbers 1 to 10,

$10 > 9 > 3 < 7 < 8 > 5 < 6 > 4 > 1 < 2$

If you are given "<" ">" symbols in some sequence,  
can you write numbers 1, 2, 3, ....., 10  
which respects this:

$> > < < > < < > <$

Can you think and give me an answer for it? What's the question? Given any sequence of greater than, less than symbols, you should put 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 in some order such that these less than, greater than symbols are actually respected? Think.

### IIT Madras Production

Founded by  
Department of Higher Education  
Ministry of Human Resource Development  
Government of India

[www.nptel.iitm.ac.in](http://www.nptel.iitm.ac.in)

Copyright Reserved