

NPTEL

NPTEL ONLINE COURSE

Discrete Mathematics

Let Us Count

Paper Folding Example

Prof. S.R.S Iyengar

Department of Computer Science

IIT Ropar

To make the best use of the course you should not watch the videos like you would watch a movie clip. A five minute video clip should involve a lot of pause and play button presses. You should sit with the book and pen and try to figure out what is being said. Rewind button is a must at times too. So we have started the chapter, let us count, we will now be moving ahead with a few motivational questions. As we proceed with the chapter you will understand the relevance of these questions and examples.

So let's get started.

Hey Simran.

Hello.

What are you doing?

I am shredding these papers.

So you are going to tear it continuously until you can't tear anymore, is it?

Yeah that's what I am doing to do.

Assume a very big sheet of paper is given to you and you tear it 40 times one after the other. Pile it up, tear it, pile tear it, and keep them on top of each other. How tall do you think it will be?

Do you saw the question here? The question is if you keep tearing a sheet of paper and keep piling it one on top of the other after roughly 40 plus such attempts and in case you can pile all the sheets one on top of the other, it will be enough for you to step on it and touch the moon. By that I mean it will be – that the pile will be so tall that it will cover the distance between Earth and the moon. What do we infer from this? We infer that counting has a different connotation here. By counting we mean count the number of objects in a system. The system here was as you keep tearing the paper you would want to count the total number of papers. You are piling it bigger and bigger. You see. And then you step on top of the pile and your height increases. The point is if you tear it roughly let's say 40 times and then stand on top of it you can touch the moon. The point is it's unbelievable but true that it very rapidly increases when you keep doubling the number of sheets that you have by tearing all of them and then piling it and then tearing all of them and so on.

So a word of suggestion but one should not take this example very seriously because you see it's practically not possible for one to tear a piece of paper beyond let's say five iterations. One, two, three, four, five, and it gets very thick. You cannot in fact there and up to 40 times is theoretically possible, one can talk about it but practically one cannot tear so much. But this apart, the point to note is that counting is indeed important.

Let us see another example to illustrate this fact.

IIT Madras Production

Funded by

Department of Higher Education

Ministry of Human Resource Development

Government of India