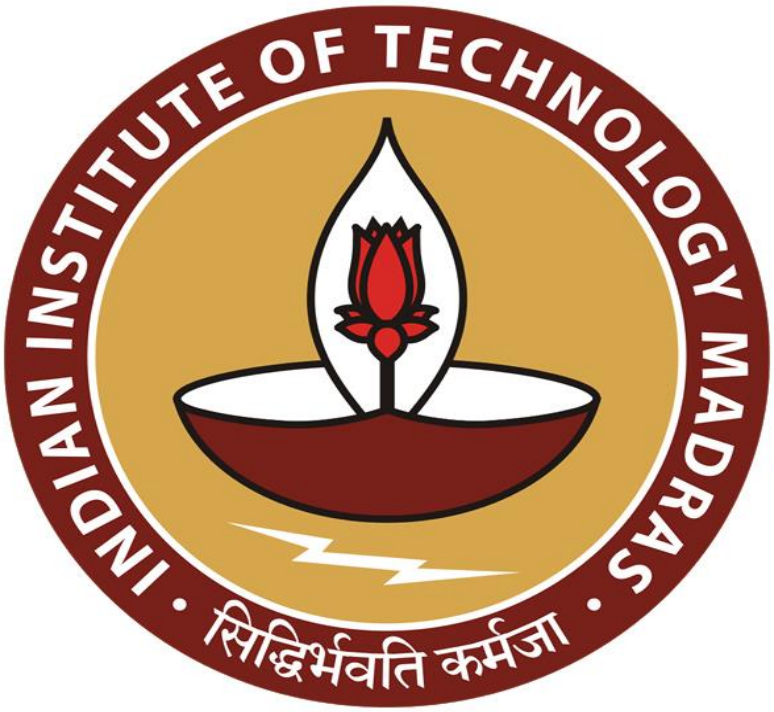

IIT Madras

ONLINE DEGREE

Statistics for Data Science – 1
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Week - 5 Tutorial - 1

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Hello, statistics students. In the tutorials for week five, we will be doing problems on counting principles. So in this problem, we are looking at the permutations of the word GRAPH. And they are arranged in dictionary order, which means they go alphabetically.

So if we were to put them down, the very first word would begin with A, which is the first letter. And then what is the next one? We have G coming up next. This is in the alphabetical order. And then we have H, then we have P, and then we have R. So this would be the very first word.

And then the second word would be what is next, you still have A, you would still have G, you would still have H, and these two are going to be exchanged. So this would be the second word. And then the third one and this order would be; A still there, G still there. But in the place of H, we put P, and then H R, and so on, and so forth, you will get so and so number of permutations.

How many permutations do we get on a five-letter word? We would get 5! because there are no repetitions. So 5! is 120. So you will have 120 permutations. And the last one is just going to be the reverse of the first one. So you will have RPHGA at the end. So what is the 73rd word is what we are looking at.

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For that, now let us look at how many words we will get which begin with A. So if we fix A as the first letter, then we have four remaining boxes to be filled. And how many such permutations can we get? We will get 4! because there are four boxes to be filled and all of them are filled by different objects.

So 4! here is 24. So the number of words starting with A is 24. Then let us look at the number of words that start with G, which is the next in the alphabetical order. And again, we have 4. So

again, 4! which gives us 24 words with G. Then we go next to H which again gives us 4!. So again 24.

So, so far, till this point, we have seen 72 words which means the next one in order is the 73rd word. And what is the next one in order? It has to start with P. So the first letter has to be P because after A and G and H comes P. And then the remaining we have to place in alphabetical order. So what are the remaining? Here, you will have A, this will be G, this is H, and this is R. So the permutation number 73 is PAGHR.