So let me paraphrase what the professor just explained, he was talking of derangements, what do we mean by that? Consider these 4 numbers 1, 2, 3, 4,
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the question basically is in how many ways can you arrange 1, 2, 3, 4 such that 1 does not come in this slot, 2 does not come in this slot, 3 does not come in this lot, and 4 does not come in this slot,
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so basically 1 should not come in the first place, 2 in the second place, 3 in the third place and 4 in the fourth place, in how many ways can you arrange it? So 1 can either come here, here or here,

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2 can come here, here, or here and 3 can occupy these places, and 4 can occupy these places,

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Derangements

so do you see none of these numbers are occupying their original position, right, so here are a few enumerations rather all the enumerations 2341, 2413, 2143, 3142, 3412, 3421, 4123, 4312 and 4123, (Refer Slide Time: 01:29)

2341	3142	4123
2413	3412	4312
2143	3421	4123

so do you see that in all these 9 permutations of 1, 2, 3, 4 the number I is not in its ith position, (Refer Slide Time: 01:42)

$$2341 \qquad 3142 \qquad 4123$$
$$2413 \qquad 3412 \qquad 4312$$
$$2143 \qquad 3421 \qquad 4123$$

9 permutations

Number i is not in i^{th} position.

right, 2 is not in the second place, 1 is not in the first place, 3 is not in the third place and 4 is not in the fourth place, these are called as derangements.

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