NPTEL
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Discrete Mathematics
Logic
Logical Equivalence - Part 4
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Let's consider another example. I would like to look at this Boolean expression P and not Q or not P AND Q. So what all should I find? I should first find P, Q not P, not Q and then P AND not Q and finally not P AND Q and this will help me determine my given Boolean expression right. That's all we have. This is just to be organized. You can in fact if you have the right talent you can directly write down the truthtable of P and not Q or not P AND Q I am just being organized and writing everything that it becomes easy for me to compute. P, 0, 0, 1, 1. Q 0, 1, 0, 1. Not P is 1, 1, 0, 0. Not Q will be 1, 0, 1, 0. P AND not Q will be 0 and 1 is 0, 0, and 0 is 0, 1, and 1 is 1. 1 and 0 is 0. So not P AND Q is not P and Q will be 1 and 0 is 0. 1 and 1 is 1. 0 and 0 is 0. 0 and 1 is 0. Now it should take an OR of P AND not Q and not P AND Q. I should take an OR of these two. So how do I do that? 0 OR 0 is 0. 0 OR 1 is 1. 1 OR 0 is 1. 0 OR 0 is 0. Do you observe something? This looks very familiar to me. What is that? This is nothing else but your P exclusive OR Q right. P XOR Q is 0, 1, 1, 0. So what do I conclude? I conclude that the given expression P AND not Q or not P AND Q is logically equivalent to my P exclusive OR Q right. I repeat whenever truthtable agree their corresponding expressions are considered equivalent. That's only obvious right.

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