Normal Forms

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- The problem of finding whether a given statement is tautology or contradiction or satisfiable in a finite number of steps is called the Decision Problem.
- For Decision Problem, construction of truth table may not be practical always.
- We consider an alternate procedure known as the reduction to normal forms.

There are two such forms:

1. Disjunctive Normal Form (DNF)
2. Conjunctive Normal Form

Disjunctive Normal Form (DNF):

If p, q are two statements, then "p or q" is a compound statement, denoted by $p \vee q$ and referred as the disjunction of p and q. The disjunction of p and q is true whenever at least one of the two statements is true, and it is false only when both p and q are false

p	**q**	**$p \vee q$**
T	T	T
T	F	T
F	T	T
F	F	F

Example: - if p is "4 is a positive integer" and q is "√5 is a rational number", then p ∨ q is true as statement p is true, although statement q is false.

Conjunctive Normal Form:

If p, q are two statements, then "p and q" is a compound statement, denoted by p ∧ q and referred as the conjunction of p and q. The conjunction of p and q is true only when both p and q are true, otherwise, it is false

p	**q**	**p ∧ q**
T	T	T
T	F	F
F	T	F
F	F	F

Example: if statement p is "6<7" and statement q is "-3>-4" then the conjunction of p and qis true as both p and q are true statements.