NPEC on the Truth Table

Here are the truth table definitions of Necessity, Possibility, Equivalence, and Consequence (NPEC).

Note that the first two (Necessity and Possibility) are features of *individual* sentences. The second two (Equivalence and Consequence) are relationships between *multiple* sentences.

Truth Table Necessities (Tautologies)

A sentence P is truth table necessary (a tautology) if and only if it is true (i.e., has the value $\mathtt{T}$ under its main connective) on **every** row of its truth table.

TT-Possibility

A sentence P is truth table possible if and only if it is true on **at least one** row of its truth table.

TT-Equivalence

Two sentences P and Q are TT-equivalent (tautologically equivalent) if and only if they have the same truth value (under their main connectives) in **every** row of their joint truth table.

TT-Consequence

A sentence Q is a tautological consequence of $\mathsf{P}_1, \ldots, \mathsf{P}_n$ if and only if every row of the truth table on which all of $\mathsf{P}_1 \ldots \mathsf{P}_n$ are true is a row where Q is true. That is, Q is a consequence of $\mathsf{P}_1 \ldots \mathsf{P}_n$ if and only if there is no counterexample row. (A counterexample row is one where $\mathsf{P}_1 \ldots \mathsf{P}_n$ are all true but Q is false.)

This means that an argument is TT-valid if and only if its conclusion is a TT-consequence of its premises!

Also note that this means that two sentences are TT-equivalent if and only if they are TT-consequences of one another!