Connectives & Truth-Tables

1. Connectives

1) binary connectives: take two inputs (connect two sentences) and produce a third sentence as output.
   - ① ... or ...
   - ② ... and ...
   - ③ ... but ...
   - ④ ... if ...
   - ⑤ If ... then ...
   - ⑥ ... because ...
   - ⑦ ... and then ...
   - ⑧ Neither ... nor ...
   - ⑨ ... even if ...

   e.g. Steve saw Sarah even if Steve went to the party ① ② ③

2) Unary Connective: take one input
   - ① It is not the case that
   - ② Maybe ...
   - ③ Necessarily ...
   - ④ It is true that ...

2. Truth-Functional Connectives

P	Q	P and Q	P and then Q	P because Q	P or Q
T	T	T	???	???	T
T	F	F	F	F	T
F	T	F	F	F	T
F	F	F	F	F	F

1) Observe the table:

① The '???' shows 'and then' & 'because' not depend only on the truth-value of P and of Q; it also depends on the order in which things happen.

2) All we need to know is the truth value of P and of Q; Thus we say that 'and' and 'or' are truth-functional connectives

① '∧' for 'and'

② '∨' for 'or'

③ → (if... then...)

④ ↔ (... if and only if ...)

P	Not the case that P	Maybe P	Necessarily P	True that P
T	F	T	???	T
F	T	???	F	F

3) Similarly, 'it is not the case that' and 'it is true that'

① '∼' for 'it is not the case that'

3. Characteristic Truth-Tables.

P	Q	P ∧ Q	P ∨ Q	P → Q	P ↔ Q	∼P
T	T	T	T	T	T	F
T	F	F	T	F	F	F
F	T	F	T	T	F	T
F	F	F	F	T	T	T

4. Terminology.

1) $P \wedge Q$: conjunction : P and Q are the left and right conjuncts.
2) $P \vee Q$: disjunction : P and Q are the left and right disjuncts.
3) $\sim P$: negation; P is the negand.
4) $P \rightarrow Q$: conditional : P is the antecedent & Q is consequent.
5) $P \leftrightarrow Q$: biconditional : P and Q are the left and right constituents.