## Definitions

1. Define the classical zero-order language!

The classical zero-order language is an ordered triple

$$L(0) = \langle LC; Con; Form \rangle$$

where

1. $LC = \{\neg; \supset; \wedge; \vee; \equiv; (;)\}$ (the set of logical constants).
2. $Con \neq \emptyset$; the countable set of non-logical constants (propositional parameters)
3. $LC \backslash Con = \emptyset$;
4. The set of formulae i.e. the set Form is given by the following inductive definition:
    - $Con \subset Form$
    - If $A \in Form$, then $\neg A \in Form$.
    - If $A; B \in Form$, then $(A \wedge B) \in Form$, $(A \vee B) \in Form$, $(A \supset B) \in Form$, $(A \equiv B) \in Form$.

2. Define the direct subformula!

- If $A$ is an atomic formula, then it has no direct subformula;
- $\neg A$ has exactly one direct subformula: $A$;
- direct subformulae of formulae $(A \wedge B)$, $(A \vee B)$, $(A \supset B)$, $(A \equiv B)$ are formulae A and B, respectively.

3. Define the set of subformulae!

The set of subformulae of formula A – denoting: $SF(A)$ – is given by the following inductive definition:

1. $A \in SF(A)$
   (i.e. the formula A is a subformula of itself);
2. if $A' \in SF(A)$ and $B$ is a direct subformula of $A'$, then $B \in SF(A)$
   (i.e., if $A'$ is a subformula of $A$, then all direct subformulae of $A'$ are subformulae of $A$).

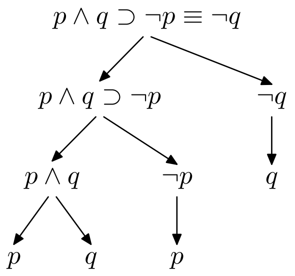
4. Define the construction tree!

The contruction tree of a formula $A$ is a finite ordered tree whose nodes are formulae,

- the root of the tree is the formula $A$,
- the node with formula $\neg B$ has one child: the node with the formula $B$,
- the node with formulae $(B \vee C)$, $(B \wedge C)$, $(B \supset C)$, $(B \equiv C)$ has two children: the nodes with $B$, and $C$ the leaves of the tree are atomic formulae.

## Practical part

5. Construction tree of $p \wedge q \supset \neg p \equiv \neg q$.




6. Logical degree of $p \wedge q \supset \neg p \equiv \neg q$.

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7. Direct subformulae of $p \wedge q \supset \neg p \equiv \neg q$.

$p \wedge q \supset \neg p$, and $\neg q$

8. Set of subformulae for $p \wedge q \supset \neg p \equiv \neg q$.

$$\{p \wedge q \supset \neg p \equiv \neg q, p \wedge q \supset \neg p, \neg q, p \wedge q, \neg p, q, p\}$$

9. Logical degree, direct subformulae, and set of subformulae for

1. $p \wedge (q \supset \neg p) \equiv \neg q$.
2. $p \wedge q \supset (\neg p \equiv \neg q)$.
3. $\neg p \wedge q \vee \neg q$.
4. $\neg(p \wedge q \vee \neg q)$.
5. $p \supset \neg q \wedge \neg p$.
6. $(p \supset \neg q) \wedge \neg p$.
7. $p \supset \neg q \equiv \neg p$.
8. $p \supset \neg(q \equiv \neg p)$.
9. $\neg p \wedge \neg(q \vee \neg p)$.
10. $\neg p \vee \neg(q \wedge \neg p)$.