Mathematical induction as a higher-order logical principle based on permutations of F>F=T.

From: en.wikipedia.org/wiki/Higher-order_logic

"First-order logic quantifies only variables that range over individuals; second-order logic, in addition, also quantifies over sets; third-order logic also quantifies over sets of sets, and so on.

For example, the second-order sentence

$$\forall P \ ( ( 0 \in P \land \forall i \ ( i \in P \rightarrow i + 1 \in P ) ) \rightarrow \forall n \ ( n \in P ) )$$  \hfill (1.1)

expresses the principle of mathematical induction. Higher-order logic is the union of first-, second-, third-, …, nth-order logic; i.e., higher-order logic admits quantification over sets that are nested arbitrarily deeply."

**Remark:** The element nth-order logic implies it is a permutation.

We evaluate higher-order logic based on the principle of mathematical induction.

We assume the Meth8/VŁ4 apparatus and method.

**LET:** p q r P i n; # necessity, all, \forall; % possibility, one or some; + Or; - Not Or; & And; > Imply, \rightarrow; < Not Imply, less than, \in; 1 (%p>#p); 0 (p@p) .

The designated proof value is \(T\); \(F\) contradiction; \(C\) falsity; \(N\) truth.

The 16-valued truth tables are row-major and presented horizontally.

Eq. 1.1 is a higher-order logic expression where the entire formula is universally quantified on one set (P) over universally quantified variables (i, n).

Meth8/VŁ4 treats sets and variables as variables. Therefore Eq. 1.1 can be rendered by inserting quantifiers to modify each occurrence of a variable:

$$(((p@p)<#p)&((q<#p)>((q+(%p>#p))<#p))>(#r<#p) ; \hfill (1.2)$$

We examine the antecedent and consequent of Eq. 1.2.

$$(((p@p)<#p)&((q<#p)>((q+(%p>#p))<#p)) ; \hfill (1.3)$$

\(#r<#p ; \hfill (1.4)$$

The principle of induction in Eq. 1.2 is tautologous as a permutation by way of the generic format of F>F=T.