

Refutation of constructive Brouwer fixed point theorem

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We assume the method and apparatus of Meth8/VL4 with \top as the designated *proof* value, F as contradiction, N as truthity (non-contingency), and C as falsity (contingency). The 16-valued truth table is row-major and horizontal.

LET: $+$ Or; $\&$ And; $>$ Imply, greater than; $=$ Equivalent.

We construct the Brouwer fixed point theorem (BFPT) as implications of four variables:

the antecedent is the relationship of their rank orders; (21.1)

$$((p>q)>r)>s ; \quad \text{TFTT FFFF TTTT TTTT} \quad (21.2)$$

the consequent is disjunction of relational pairs of variables (away tautologous); and (22.1)

$$(((p>q)+(p>r))+(p>s))+(((q>r)+(q>s))+(r>s)) ;$$

$$\text{TTTT TTTT TTTT TTTT} \quad (22.2)$$

the implication is always tautologous. (23.1)

$$(((p>q)>r)>s) > (((p>q)+(p>r))+(p>s))+(((q>r)+(q>s))+(r>s)) ;$$

$$\text{TTTT TTTT TTTT TTTT} \quad (23.2)$$

Eq. 23.2 as rendered is tautologous, and on its face appears as a constructive proof of BFPT.

However there is problem as to completeness because the antecedent is composed of the totality of ordered combinations.

Consequently, the connective is equivalence. (24.1)

$$(((p>q)>r)>s) = (((p>q)+(p>r))+(p>s))+(((q>r)+(q>s))+(r>s)) ;$$

$$\text{TFTT FFFF TTTT TTTT} \quad (24.2)$$

Eq. 24.2 is *not* tautologous, and refutes BFPT using a constructive proof.

Remark: If the consequent is taken as a multiplicity of ordered combinations, the equivalence connective and the implication connective share the same table result which deviates further from Eq. 24.2 with another F contradictory value. (25.1)

$$(((p>q)>r)>s) [= or >] (((p>q)\&(p>r))\&(p>s))\&(((q>r)\&(q>s))\&(r>s)) ;$$

$$\text{TFFF TTTT TFFF TFFT} \quad (25.2)$$

We conclude that BFPT is mislabeled as a theorem, as non constructively based on set theory, and correctly named as the Brouwer fixed point conjecture (BFPC).