Refutation of domain theory and the Scott model of language PCF in univalent type theory

Abstract: The definitions of directed, complete posets for antisymmetry and transitivity are *not* tautologous, thereby refuting basic domain theory. By extension, the Scott model of language PCF in univalent type theory is also refuted and another *non* tautologous fragment of the universal logic VŁ4.

We assume the method and apparatus of Meth8/VŁ4 with `T`autology 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, or repeating fragments of 128-tables, sometimes with table counts, for more variables.
(See ersatz-systems.com.)

LET ~ Not, ¬ ; + Or, ∨, ∪, ⊔ ; - Not Or; & And, ∧, ∩, ⊓, ·; \ Not And;
> Imply, greater than, →, ⇒, ↦, ≻, ⊃, ↠ ;
< Not Imply, less than, ∈, ≺, ⊂, ⊬, ⊭, ↞, ≲ ;
= Equivalent, ≡, :=, ⟺, ↔, ≜, ≈, ≃ ; @ Not Equivalent, ≠;
% possibility, for one or some, ∃, ◊, M; # necessity, for every or all, ∀, □, L;
(z=z) `T` as tautology, ⊤, ordinal 3; (z@z) **F** as contradiction, Ø, Null, ⊥, zero;
(%z>#z) `N` as non-contingency, Δ, ordinal 1;
(%z<#z) `C` as contingency, ∇, ordinal 2;
~(y < x) (x ≤ y), (x ⊆ y); (A=B) (A~B); (B>A) (A⊢B); (B>A) (A⊨B).
Note for clarity, we usually distribute quantifiers onto each designated variable.

From: de Jong, T. (2019). The Scott model of PCF in univalent type theory. arxiv.org/pdf/1904.09810.pdf t.dejong@pgr.bham.ac.uk

2 Basic domain theory
We introduce basic domain theory in the setting of constructive univalent mathematics.
2.1 Directed complete posets

Definition 2.1. A *poset* (X, ≤) is a set X together with a proposition valued binary relation ≤: X → X → Ω satisfying:

(i) *reflexivity*: Qx:X x ≤ x; (2.1.i.1)
LET p, q, r: x, y, z.
~(p<p) = (p=p) ; TTTT TTTT TTTT TTTT (2.1.i.2)

(ii) *antisymmetry*: Qx,y:X x ≤ y → y ≤ x → x = y; (2.1.ii.1)
(~(q<p)>~(p>q))>(p=q) ; T**FF**T T**FF**T T**FF**T T**FF**T (2.1.ii.2)

(iii) *transitivity*: Qx,y,z:X x ≤ y → y ≤ z → x ≤ z. (2.1.iii.1)
(~(q<p)>~(p>r))>~(r<p) ; TTTT TT**F**T TTTT TT**F**T (2.1.iii.2)

Eqs. 2.1.ii.2 and 2.1.iii.2 as rendered are *not* tautologous. The definitions of directed, complete posets for antisymmetry and transitivity are *not* tautologous, thereby refuting basic domain theory. By extension the Scott model of programming language PCF in univalent type theory is also refuted.