

Entangled XOR Theorem

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In this paper I present an entangled XOR theorem found in Path Semantical Logic.

The Entangled XOR Theorem is a proof in Path Semantical Logic^[1]:

(a, b, c) (A, B, C):

(a \vee b)=(b \vee c), a(A), b(B), c(C)

(A \Rightarrow B \Rightarrow B=C) \wedge (C \Rightarrow B \Rightarrow A=B)

Where the tuple `(a, b, c)` has level 1 and the tuple `(A, B, C)` has level 0.

The notation `a(A)` means `a \Rightarrow A` where `A` is at a lower level.

From the conclusion `(A \Rightarrow B \Rightarrow B=C) \wedge (C \Rightarrow B \Rightarrow A=B)` can also prove in normal PL^[2]:

A=B = B=C

Which in turn implies in normal PL:

B \Rightarrow A = B \Rightarrow C

References:

- [1] “Path Semantical Logic”
AdvancedResearch, reading sequence on Path Semantics
https://github.com/advancedresearch/path_semantics/blob/master/sequences.md#path-semantical-logic

- [2] “Propositional calculus”
Wikipedia
https://en.wikipedia.org/wiki/Propositional_calculus