

Ideal Quaternary Semantics of Attack Trees

Logical Sequent (implication) is a Partial Ordering:

$$A \leq_4 B$$

Equivalence of Attack Trees:

$$A \equiv B \text{ iff } (A \leq_4 B) \text{ and } (B \leq_4 A)$$

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Basic Properties for Choice:

$$A \leq_4 (A \sqcup_I B)$$

$$B \leq_4 (A \sqcup_I B)$$

$$(A \sqcup_I B) \equiv (B \sqcup_I A)$$

$$((A \sqcup_I B) \sqcup_I C) \equiv (A \sqcup_I (B \sqcup_I C))$$

$$\text{If } A \leq_4 C \text{ and } B \leq_4 D, \text{ then } (A \sqcup_I B) \leq_4 (C \sqcup_I D)$$