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Tense Trees: A Tree System for K_t

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In this paper Jeffrey's elegant and simple decision procedure for the classical propositional calculus is extended to yield a decision procedure for Lemmon's minimal tense logic K_t. Familiarity with Jeffrey [1] is assumed.

The syntax used is that of McArthur ([3], p. 17), who takes as primitive a stock of present tensed statements, the connectives $\sim$ and $\supset$, the future tense operator F ("it will be the case that"), and the past tense operator P ("it has been the case that"). The operator G ("it will always be the case that") is defined as $\sim F \sim$, and the operator H ("it has always been the case that") as $\sim P \sim$. Letters A, B, C are used to represent arbitrary wffs.

Preamble concerning the axiomatic system K_t Various formulations of Lemmon's system K_t exist; the following is taken from McArthur ([3], p. 18).

Axioms

all truth functional tautologies
$G(A \supset B) \supset (GA \supset GB)$
$H(A \supset B) \supset (HA \supset HB)$
$A \supset HFA$
$A \supset GPA$
GA if A is an axiom
HA if A is an axiom

Rule

modus ponens on $\supset$

K_t is a *minimal* tense logic—a tense logic involving no assumptions concerning the physical properties of time. Logics which do make such assumptions may be obtained by the addition of further axioms to K_t. For example, the addition of the following axioms yields a logic for infinite linear time (Scott [6], p. 2):

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