

Logic

Tutorial 4 - Semantic Tableaux

7 November 2019

Exercises

1. Using the semantic tableaux method, determine whether the following formula is valid, consistent or inconsistent.

$$(p \Rightarrow q) \Rightarrow [(\neg p \Rightarrow q) \Rightarrow q]$$

2. Using the semantic tableaux method, determine whether the following formula is valid, consistent or inconsistent.

$$[(p \vee q) \wedge (p \Rightarrow r) \wedge (q \Rightarrow s)] \Rightarrow (r \Rightarrow s)$$

Give a model of the formula if possible.

3. Using the semantic tableaux method, determine whether the following formula is valid, consistent or inconsistent.

$$[p \Rightarrow (q \Rightarrow r)] \Rightarrow [(p \Rightarrow q) \Rightarrow (p \Rightarrow r)]$$

4. Determine whether the following formulas are valid, consistent or inconsistent using three different methods.

(a) $(\neg p \Rightarrow q) \vee (p \Rightarrow \neg q)$

(b) $(p \wedge q) \vee (q \wedge r) \vee (r \wedge p)$

(c) $[(p \wedge q) \vee (\neg p \wedge \neg q)] \vee [(\neg p \wedge q) \vee (p \wedge \neg q)]$

(d) $[(p \wedge q) \Rightarrow (r \wedge s)] \Rightarrow [(p \wedge q) \Rightarrow (r \wedge s)]$

(e) $(a \equiv (b \Rightarrow c)) \equiv [(a \wedge c) \vee (\neg(a \equiv b) \wedge \neg c)]$