Opgave 5.31

(g)
$$p \land (q \lor r) \vdash (p \land q) \lor (p \land r)$$

| 1 | $p \wedge (q \vee r)$ | ass |
|----|---|----------------------|
| 2 | p | $\wedge E$, 1 |
| 3 | $(q \lor r)$ | $\wedge E$, 1 |
| 4 | q | ass |
| 5 | $(p \land q)$ $(p \land q) \lor (q \lor r)$ | $\land I, 2, 4$ |
| 6 | $ (p \land q) \lor (q \lor r) $ | $\vee I, 5$ |
| 7 | | ass |
| 8 | $(p \wedge r)$ | $\wedge I,2,7$ |
| 9 | $(p \wedge r)$ $(p \wedge q) \vee (q \vee r)$ | ∨I, 8 |
| 10 | $ (p \land q) \lor (q \lor r) $ | $\forall I, 1, 6, 9$ |
| | | |

Opgave 5.32

(2)
$$p \wedge (q \wedge r) \vdash r \wedge p$$

(3)
$$p \to (q \land r), q \to s, p \vdash s$$

$$\begin{array}{c|cccc} 1 & p \rightarrow (q \wedge r) & \text{ass} \\ 2 & q \rightarrow s & \text{ass} \\ 3 & p & \text{ass} \\ 4 & (q \wedge r) & \Rightarrow \text{E, 1, 3} \\ 5 & q & \wedge \text{E, 4} \\ 6 & s & \Rightarrow \text{E, 2, 5} \end{array}$$

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Opgave 5.33

(2)
$$\varphi \lor (\psi \land \chi); (\varphi \lor \psi) \land (\varphi \lor \chi)$$

$$\varphi \lor (\psi \land \chi) \circ (\varphi \lor \psi) \land (\varphi \lor \chi)$$

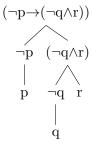
$$\varphi \lor (\psi \land \chi) \circ (\varphi, \psi) \land (\varphi, \chi)$$

$$\varphi \lor (\psi, \chi) \circ (\varphi, \psi) \land (\varphi, \chi)$$

Opgave 5.37

(2)
$$\varphi \leftrightarrow \psi$$
; $(\varphi \rightarrow \psi) \land (\psi \rightarrow \varphi)$

(3)
$$\varphi \to \psi; \neg \psi \to \neg \varphi$$



Opgave 5.38

$$(3) ((p \to q) \land (q \to r)) \to (p \to r)$$

Opgave 5.53

Geef de semantische tableauregels voor de Quine dolk †.

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