

Kontrolltöö 8.10.2012

Kõik kirjalikud/trükitud abimaterjalid on lubatud. Vestlemine on keelatud. Arvutid ja mobiiltelefonid on keelatud.

Kontrolltöö kestus on 1.5 tundi.

1. Vii konjunktiivsele normaalkujule valem

$$\neg(((p \vee \neg q) \wedge r) \supset \neg s) \vee t$$

2. Konstrueeri disjunktiiisel normaalkujul valem A , mis esitaks seda tõeväärtustabelit:

p	q	r	A
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

(Võid anda täieliku disjunktiiivse normaalkuju, võid ka seda minimeerida.)

3. Tõesta loomulikus tuletuses ja sekvensiarvutuses valemid

$$(p \vee r \supset q) \supset (p \supset q \vee s)$$
$$\neg(p \supset q) \supset \neg q$$

Loomuliku tuletuse, sekvensiarvutuse reeglid pöördel.

Loomulik tuletus:

$$\begin{array}{c}
\overline{\top} \top \mathcal{I} \\
- \\
\frac{A \quad B}{A \wedge B} \wedge \mathcal{I} \\
\frac{A}{A \vee B} \vee \mathcal{I}_L \quad \frac{B}{A \vee B} \vee \mathcal{I}_R \\
\frac{A}{A \supset B} \supset \mathcal{I} \\
\frac{\perp}{\neg A} \neg \mathcal{I} \\
\frac{A}{\perp} \perp \mathcal{I}
\end{array}
\qquad
\begin{array}{c}
- \\
\frac{\perp}{C} \perp \mathcal{E} \text{ (EFQ)} \\
\frac{A \wedge B}{A} \wedge \mathcal{E}_L \quad \frac{A \wedge B}{B} \wedge \mathcal{E}_R \\
\frac{A \vee B \quad \begin{array}{c} A \\ \vdots \\ C \end{array} \quad \begin{array}{c} B \\ \vdots \\ C \end{array}}{C} \vee \mathcal{E} \\
\frac{A \supset B \quad A}{B} \supset \mathcal{E} \text{ (MP)} \\
\frac{\neg A \quad A}{\perp} \neg \mathcal{E} \\
\frac{\begin{array}{c} A \quad \neg A \\ \vdots \quad \vdots \\ C \quad C \end{array}}{C} \text{ dil.}
\end{array}$$

Sekventsiarvutus:

$$\overline{\Gamma, A \rightarrow A, \Delta} \text{ hyp}$$

$$\begin{array}{c}
\overline{\Gamma \rightarrow \top, \Delta} \top \mathcal{R} \\
\frac{\Gamma \rightarrow \Delta}{\Gamma \rightarrow \perp, \Delta} \perp \mathcal{R} \\
\frac{\Gamma \rightarrow A, \Delta \quad \Gamma \rightarrow B, \Delta}{\Gamma \rightarrow A \wedge B, \Delta} \wedge \mathcal{R} \\
\frac{\Gamma \rightarrow A, B, \Delta}{\Gamma \rightarrow A \vee B, \Delta} \vee \mathcal{R} \\
\frac{\Gamma, A \rightarrow B, \Delta}{\Gamma \rightarrow A \supset B, \Delta} \supset \mathcal{R} \\
\frac{\Gamma, A \rightarrow \Delta}{\Gamma \rightarrow \neg A, \Delta} \neg \mathcal{R}
\end{array}
\qquad
\begin{array}{c}
\frac{\Gamma \rightarrow \Delta}{\Gamma, \top \rightarrow \Delta} \top \mathcal{L} \\
\overline{\Gamma, \perp \rightarrow \Delta} \perp \mathcal{L} \\
\frac{\Gamma, A, B \rightarrow \Delta}{\Gamma, A \wedge B \rightarrow \Delta} \wedge \mathcal{L} \\
\frac{\Gamma, A \rightarrow \Delta \quad \Gamma, B \rightarrow \Delta}{\Gamma, A \vee B \rightarrow \Delta} \vee \mathcal{L} \\
\frac{\Gamma \rightarrow A, \Delta \quad \Gamma, B \rightarrow \Delta}{\Gamma, A \supset B \rightarrow \Delta} \supset \mathcal{L} \\
\frac{\Gamma \rightarrow A, \Delta}{\Gamma, \neg A \rightarrow \Delta} \neg \mathcal{L}
\end{array}$$