T-79.146 **Kevät 2002**
Logiikka tietotekniikassa: erityiskysymyksiä I
Laskuharjoitus 11
19.4.2002

1. Olkoon $\mathcal{M} = \langle S, R, v\rangle$, missä

$$\begin{aligned} S &= \{a, b, c, d, e, f\} \\ R &= \{\langle a, b\rangle, \langle b, c\rangle, \langle b, d\rangle, \langle b, e\rangle, \langle c, d\rangle, \langle d, d\rangle, \langle e, e\rangle, \langle e, f\rangle, \\ &\quad \langle f, a\rangle\} \end{aligned}$$

$\{x \mid v(x, P) = \mathit{true}\} = \{a, b, e\}$
$\{x \mid v(x, Q) = \mathit{true}\} = \{c, f\}$
$\{x \mid v(x, R) = \mathit{true}\} = \{f\}$

Olkoon $F = \{R\}$. Tutki, päteekö

a) $\mathcal{M}, a \models \mathbf{A}(P\mathbf{U}Q)$
b) $\mathcal{M}, a \models_F \mathbf{A}(P\mathbf{U}Q)$
c) $\mathcal{M}, a \models \mathbf{EG}P$
d) $\mathcal{M}, a \models_F \mathbf{EG}P$

2. Olkoon $\mathcal{M} = \langle S, R, v\rangle$, missä

$$\begin{aligned} S &= \{a, b, c, d, e\} \\ R &= \{\langle a, b\rangle, \langle a, c\rangle, \langle a, d\rangle, \langle b, c\rangle, \langle b, d\rangle, \langle c, a\rangle, \langle c, e\rangle, \langle d, b\rangle, \\ &\quad \langle d, e\rangle, \langle e, b\rangle\} \end{aligned}$$

$\{x \mid v(x, P) = \mathit{true}\} = \{a, b\}$
$\{x \mid v(x, Q) = \mathit{true}\} = \{b, c, d\}$

Missä tiloissa lause

$$\mathbf{AXE}\big((P \to Q)\mathbf{U}(P \wedge Q)\big)$$

on tosi?

3. Olkoon $\mathcal{M} = \langle S, R, v \rangle$, missä

$$S = \{a, b, c, d, e\}$$
$$R = \{\langle a, b\rangle, \langle a, c\rangle, \langle b, d\rangle, \langle d, b\rangle, \langle c, e\rangle, \langle e, c\rangle, \langle d, e\rangle\}$$
$$\{x \mid v(x, P) = \mathit{true}\} = \{a, c\}$$
$$\{x \mid v(x, Q) = \mathit{true}\} = \{b, c\}$$

Missä tiloissa lause

$$\mathbf{AG}\big(Q \rightarrow \mathbf{A}(\mathbf{EF}P\mathbf{U}\mathbf{AF}P)\big)$$

on tosi?