

Networks and Processes

Sample Solutions to Exercise 5

Discussion on – 15.1.2009, 15h45 (submissions of solutions are highly recommended, either before or after the exercise session)

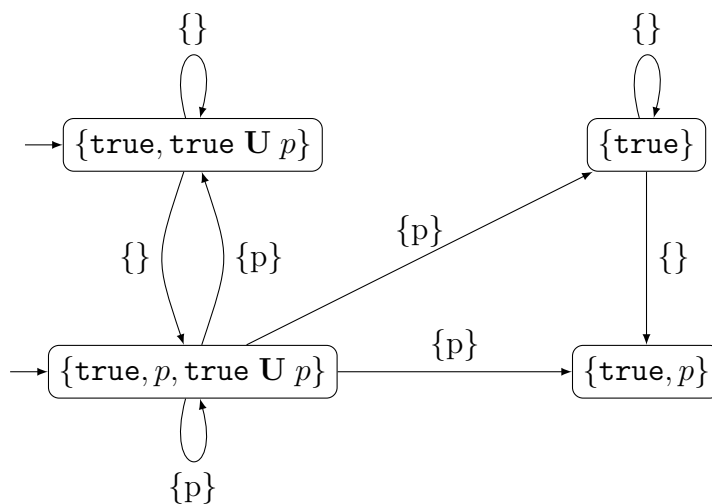
1. $\mathcal{B} = \langle \Sigma, S', S^0, \Delta', F \rangle$, where

$$\begin{aligned} S' &= S \cup \{(s, a, s') \mid (s, a, s') \in T\}, \\ \Delta' &= \Delta \cup \{s \xrightarrow{a} (s, a, s') \mid (s, a, s') \in \Delta \cap T\} \\ &\quad \cup \{(s, a, s') \xrightarrow{a'} s'' \mid (s, a, s') \in \Delta \cap T \text{ and } (s', a', s'') \in \Delta\}, \text{ and} \\ F &= \{(s, a, s') \mid (s, a, s') \in T\}. \end{aligned}$$

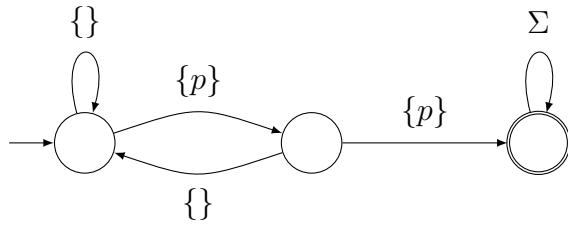
2. Given LTL formula $\phi \equiv \mathbf{F} p$. Answer the following questions.

- a) $\text{true U } p$.
- b) $\text{Sub}(\phi) = \{\text{true}, p, \text{true U } p\}$.
- c) $\text{CS}(\phi) = \{\{\text{true}\}, \{\text{true}, p\}, \{\text{true}, \text{true U } p\}, \{\text{true}, p, \text{true U } p\}\}$.
- d) $\{\text{true}, \text{true U } p\} \{\text{true}, \text{true U } p\} \{\text{true}, \text{true U } p\} \dots$
- e) $\{\text{true}, \text{true U } p\} \{\text{true}, \text{true U } p\} \{\text{true}, \text{true U } p\} \dots \{\text{true}, p\} \dots$
- f) $\mathcal{F} = \{F_{\text{true U } p}\}$, where

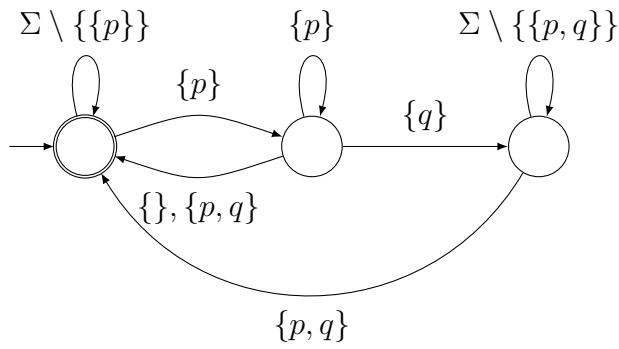
$$F_{\text{true U } p} = \{\{\text{true}\}, \{\text{true}, p\}, \{\text{true}, p, \text{true U } p\}\}.$$



3. a) $\Sigma = \{\{\}, \{p\}\}$



b) $\Sigma = \{\{\}, \{p\}, \{q\}, \{p, q\}\}$



c) $\Sigma = \{\{\}, \{p\}, \{q\}, \{p, q\}\}$

