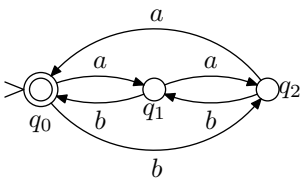
T-79.186 **Spring 2003**
Reactive Systems
Home Exercise 1
Deadline 28.1-2003 8:45

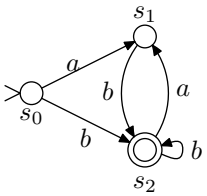
Return your answer by email (Postscript or PDF) to Timo Latvala at Timo.Latvala@hut.fi, or on paper to the lecture. All rounds will be 6 points maximum.

1.) Consider the following two finite state automata, where $\Sigma_1 = \Sigma_2 = \{a, b\}$.

Automaton $\mathcal{A}_1$:



Automaton $\mathcal{A}_2$:



a) Construct the finite state automaton $\mathcal{A}_a = \mathcal{A}_1 \cup \mathcal{A}_2$.

b) Construct the finite state automaton $\mathcal{A}_b = \mathcal{A}_1 \cap \mathcal{A}_2$.

c) Is the language accepted by $\mathcal{A}_b$ non-empty? If not, also give a word accepted by A_b.

d) Complement the (deterministic) automaton $\mathcal{A}_1$, and give the resulting automaton $\mathcal{A}_d$.

e) Give a deterministic finite state automaton $\mathcal{A}_e$, which accepts the same language as $\mathcal{A}_2$.

f) Describe the language accepted by $\mathcal{A}_1$ as a function on the number of occurrences of a and b on the words accepted by $\mathcal{A}_1$.