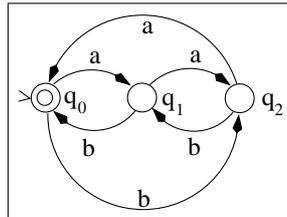
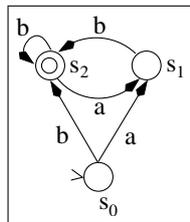


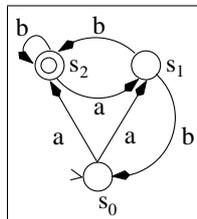
1. Consider the three following finite state automata, where $\Sigma_i = \{a, b\}$.
Automaton \mathcal{A}_1 :



Automaton \mathcal{A}_2 :



Automaton \mathcal{A}_3 :



- Construct the finite state automaton $\mathcal{A}_a = \mathcal{A}_1 \cup \mathcal{A}_2$.
- Construct the finite state automaton $\mathcal{A}_b = \mathcal{A}_1 \cap \mathcal{A}_2$.
- Is the language accepted by \mathcal{A}_b non-empty? If not, give a word accepted by \mathcal{A}_b .
- Complement the deterministic automaton \mathcal{A}_1 , and give the resulting automaton \mathcal{A}_d .
- Give a deterministic finite state automaton \mathcal{A}_e , which accepts the same language as \mathcal{A}_3 .
- Describe the language accepted by \mathcal{A}_1 as a function of the number of occurrences of a and b .