

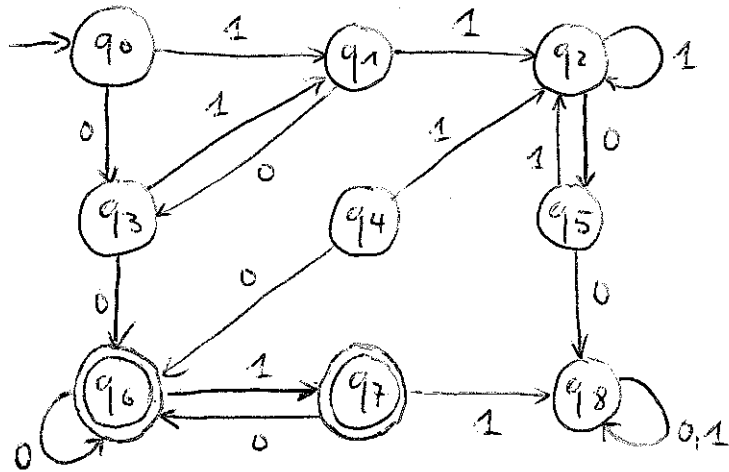
STATE MINIMIZATION

18/12/2008

E 10.1

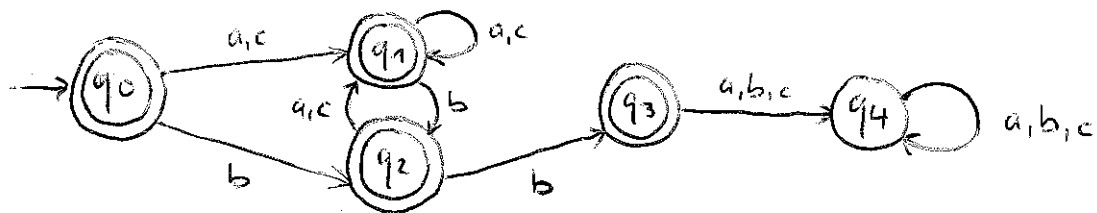
EXERCISE 1

Minimize the following DFA.



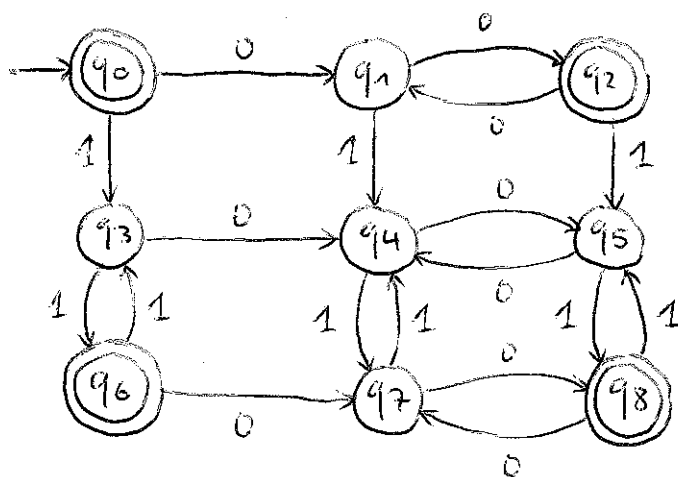
EXERCISE 2

Minimize the following DFA.

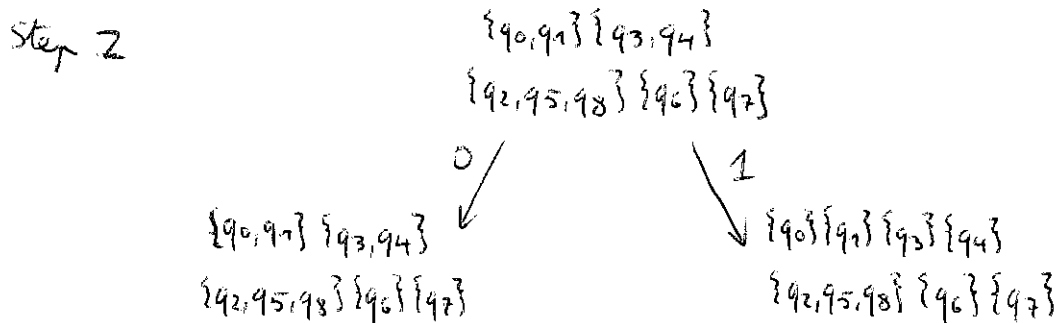
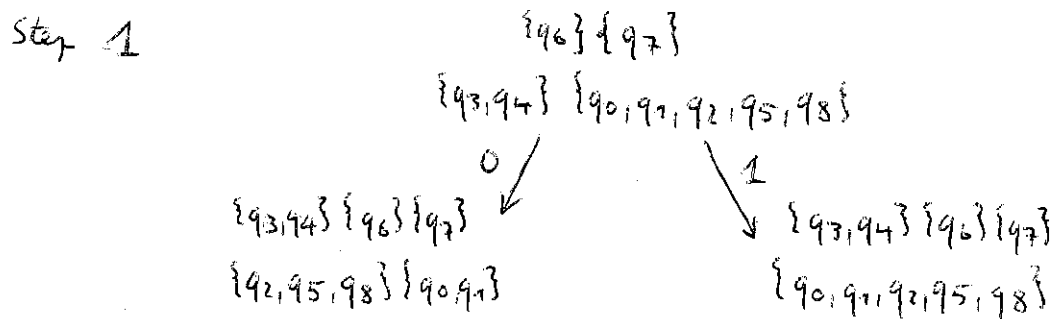
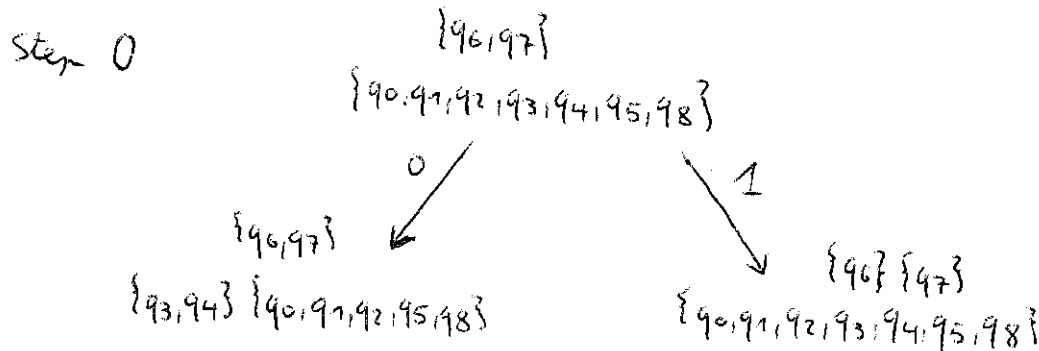


EXERCISE 3

Minimize the following DFA.

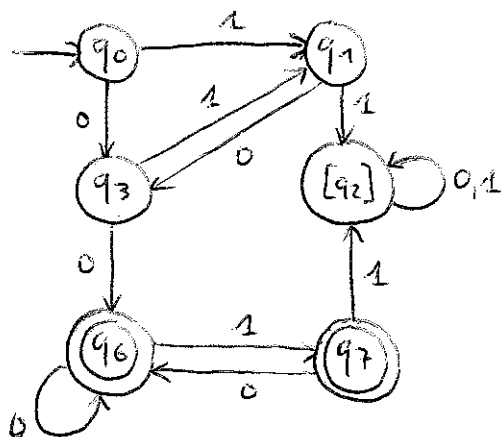


- 1) We start with the following initial partition:
 $C_1 = F = \{q_6, q_7\}$ and $C_2 = Q - F = \{q_0, q_1, q_2, q_3, q_4, q_5, q_8\}$.



Final partition: $\{q_0\} \{q_1\} \{q_2, q_5, q_8\} \{q_3\} \{q_4\} \{q_6\} \{q_7\}$

The minimized automaton looks as follows:



Note: q_4 is not reachable, thus it has been omitted from the minimized automaton

2) Initial partition:

E 10.3

$$C_1 = \{q_0, q_1, q_2, q_3\}, C_2 = \{q_4\}$$

Step 0

$$\{q_0, q_1, q_2, q_3\} \{q_4\}$$

$\downarrow a, b, c$

Step 1

$$\{q_0, q_1, q_2\} \{q_3\} \{q_4\}$$

$\swarrow a, c$

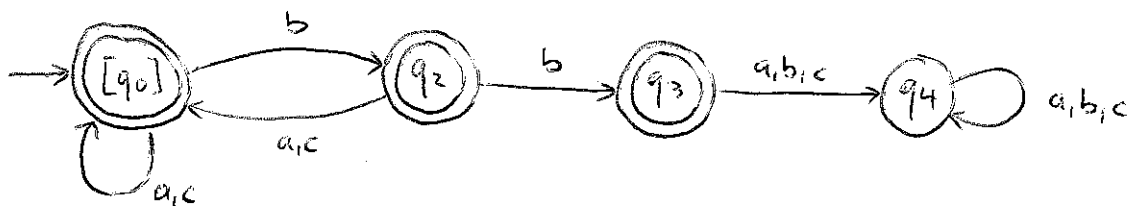
$\searrow b$

$$\{q_0, q_1, q_2\} \{q_3\} \{q_4\}$$

$$\{q_0, q_1\} \{q_2\} \{q_3\} \{q_4\}$$

Final partition: $\{q_0, q_1\} \{q_2\} \{q_3\} \{q_4\}$

The minimized automaton looks as follows:



3) Initial partition:

$$C_1 = \{q_0, q_2, q_6, q_8\}, C_2 = \{q_1, q_3, q_4, q_5, q_7\}$$

Step 0

$$\{q_0, q_2, q_6, q_8\}$$

$$\{q_1, q_3, q_4, q_5, q_7\}$$

$\swarrow 0$

$\searrow 1$

$$\{q_0, q_2, q_6, q_8\}$$

$$\{q_0, q_2, q_6, q_8\}$$

$$\{q_1, q_7\} \{q_3, q_4, q_5\}$$

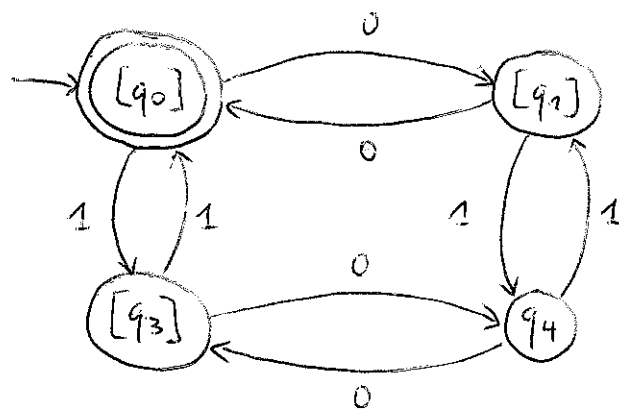
$$\{q_3, q_5\} \{q_1, q_4, q_7\}$$

Final partition: $\{q_0, q_2, q_6, q_8\} \{q_1, q_7\} \{q_3, q_5\} \{q_4\}$

3) can't

E10.4

The minimized automaton looks as follows:



Alternative solution:

One could first minimize the automata A_L^* and A_H^* of the last exercise in E8 (12/12/2008) and then apply the so-called product construction