Ordinary exercises:

1. Find the smallest deterministic finite state automaton that accepts the same language as the following nondeterministic one:

2. Consider the following two regular expressions:
   \[ R_1 = b^*a(a^*b^*)^* \]
   \[ R_2 = (a \cup b)^*a(a \cup b)^* \]

   Do they define the same language? Justify your answer by constructing the corresponding deterministic automata.

3. Prove that the language
   \[ L = \{aa^nb^n c^n \mid n \geq 0\} \]
   is not regular. Hint: remember that the intersection of two regular languages is always regular.

Demonstraatiotietävät:

4. Use a systematic algorithm to construct the regular expression that corresponds to the following finite state automaton:

5. Prove that the language \( L = \{ww^R \mid w \in \{a, b\}^*\} \) is not regular.

6. Let \( L \) be a regular language. Prove that the language \( L' = \{xy \mid x \in L \text{ and } y \notin L\} \) is regular.