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演習第五

In the following, we use the notation for regular expressions as described in Lecture 5. More specifically, | stands for union, * stands for zero or any repition of the block, and we write letters just as letters.

1. Prove or disprove the following assertions to be true:
   (1) The language generated by Λ^* is empty.
   (2) $\mathtt{baaa} \in \mathsf{L}((\mathtt{a}|\mathtt{b})^*(\mathtt{a}|\mathtt{bb}))$
   (3) $\mathsf{L}((\mathtt{ab}|\mathtt{ba})^*) = \mathsf{L}((\mathtt{ab}|\mathtt{ba})^*|(\mathtt{ab}|\mathtt{ba})^*)$
2. (1) Provide a regular expression for the language $\mathsf{L} = \{w \mid w \in \{\mathtt{a},\mathtt{b}\}^*,\ 4 \text{ divides } |w|\}$.
   (2) Find a regular expression corresponding to the language L of all strings over the alphabet $\{\mathtt{a},\mathtt{b}\}$ that contain exactly two occurences of the substring $\mathtt{aaa}$ (e.g., $\mathtt{aaaaaa}$, $\mathtt{aaababaaa}$, $\mathtt{abaaabbaaaba} \in \mathsf{L}$ but $\mathtt{baaababa}$, $\mathtt{bb} \notin \mathsf{L}$).
   (3) Find a regular expression corresponding to the language L of all strings over the alphabet $\{\mathtt{a},\mathtt{b}\}$ that do not start with $\mathtt{bb}$.
3. Construct a deterministic finite automaton accepting the language generated by the regular expression $(\mathtt{a}|\mathtt{b})^*\mathtt{b}(\mathtt{a}|\mathtt{b})(\mathtt{a}|\mathtt{b})$.