

IT-math F2003 : Classroom Exercises

Episode 12, April 29, 2003

1. Suppose the language $L \subseteq A^*$ is regular. Show that the language $\bar{L} = A^* \setminus L$ is then also regular.
2. Suppose the languages $L_1, L_2 \subseteq A^*$ are regular. Show that the language $L_1 \cap L_2$ is then also regular.
3. Let $L_1 = \{ab, bc\}$ and $L_2 = \{b, bc\}$. Find $L_1 \circ L_2$, the concatenation of the two languages.
4. Let $L = \{a\}$. Describe L^* , the Kleene star of L .
5. Which of the following regular expressions does the word $aaaa$ match?
 - (a) a^* ;
 - (b) $(\varepsilon a)^* \emptyset (\varepsilon + ba + c) a^*$;
 - (c) $(\varepsilon a)^* (\varepsilon + ba + c) a^*$.

[We say that a word w *matches* a regular expression E if w is an element of $\mathcal{L}(E)$, the language described by E .]

6. Construct a derivation of the word $ababba$ in the grammar with the productions $S \rightarrow abS$, $S \rightarrow Sba$, $S \rightarrow \varepsilon$. (S is the start symbol.)
7. Construct a regular grammar G such that $\mathcal{L}(G) = \{a, b\}^*$.