MA0301 Elementary
discrete mathematics
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Exercise set 10

1 Basic exercises

1 Find regular languages corresponding to the following regular expressions. Note, if the set is infinite, then list the first ten elements.

a) $(a \vee b)(c \vee d)$

b) $(ab^*\lambda) \vee (cd)^*$

2 Let $\Sigma := \{a, b, c, d\}$ be an alphabet. Find regular expressions that correspond to the following regular languages.

a) $\{ab, abab, ababab, abababab, \ldots\}$

b) $\{ab, abb, aab, aabb\}$

3 Let $\Sigma := \{a, b, c\}$ be an alphabet.

a) Give a regular expression for the language $L_1 \subset A^*$ where all elements have two or more b's.

b) Give a regular expression for the language $L_2 \subset A^*$ where all elements begin and end with a and contain at least one b and one c.

4 a) Draw the state diagram $D(M)$ of the automaton M with states $S := \{s_0, s_1, s_2\}$, accepting states $Y := \{s_0, s_3\}$, input alphabet $I := \{a, b\}$, described in the state table $T(M)$:

	ν	
	a	b
s_0	s_1	s_0
s_1	s_2	s_0
s_2	s_2	s_1

b) Which of the following input words are accepted by M?

1) $abba$

2) $aabbb$

3) $babab$

4) $aaabbb$

5) $bbaab$

5 a) Draw the state diagram $D(M)$ of the automaton M with states $S := \{s_0, s_1, s_2\}$, accepting states $Y := \{s_0\}$, input alphabet $I := \{a, b\}$, described in the state table $T(M)$:

	ν	
	a	b
s_0	s_0	s_1
s_1	s_0	s_2
s_2	s_2	s_2

b) Write a regular expression for the language accepted by M.

6 Find an automaton M that accepts the regular language given by the regular expression $aa^*bb^*cc^*$.