

## Lexical Analysis

### Exercise 1

For the given regular expression:

$$(a \mid bc) * d*$$

1. draw NFA (Non-deterministic Finite Automaton).
2. transform NFA to DFA (Deterministic Finite Automaton).

### Exercise 2

Explain why there are no regular expressions which can express the language  $a^n b^m$  where  $n = m$ . This means language over the alphabet  $a, b$  where there is the same number of  $as$  as  $bs$ .

### Exercise 3

Write a regular expression that matches:

*soul, sound, south, sauce, course*

But does not match:

*soup, sour, source, curse*

Try to optimize (make the expression smaller — the number of characters).

### Exercise 4

Write a regular expression for an integer number of time units (take into account only milliseconds, seconds, minutes, hours and days). You can write a separate regex for each unit, but it is recommended to merge expressions if it is more readable.

*Match:*

256ms

5s

32m

16h

4d

*Don't match:*

05ms

100s

26h