

Quiz 1 Solutions

Problem 1. Complete the definitions. Be precise.

An **alphabet** is: a finite, nonempty set (the elements of which are called “characters”).

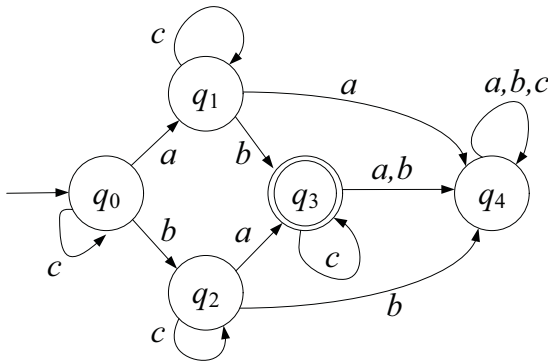
A **string** is: a finite sequence of characters from some alphabet.

A **language** is: a set of strings, all of them over the same alphabet. (Alternatively, it is a subset of Σ^* for some alphabet Σ .)

Problem 2. Draw a **DFA** M for the language

$$L = \{x \in \{a, b, c\}^* : x \text{ contains exactly one } a \text{ and exactly one } b\}.$$

(A string $x \in L$ can contain any number of c 's.) Make your DFA have as few states as possible.



Problem 3 Using the formalism of your book, specify the machine M from Problem 2 as a 5-tuple: $M = (Q, \Sigma, \delta, q_0, F)$ where \dots

$Q = \{q_0, q_1, q_2, q_3, q_4\}$ and $\Sigma = \{a, b, c\}$ and $F = \{q_3\}$, and δ is specified by the table

state	a	b	c
q_0	q_1	q_2	q_0
q_1	q_4	q_3	q_1
q_2	q_3	q_4	q_2
q_3	q_4	q_4	q_3
q_4	q_4	q_4	q_4

Problem 4 List the first 5 strings of L (still from Problem 2) in lexicographic order. Assume $a < b < c$.

ab, ba, abc, acb, bac