



### Computation and Discrete Structures III

Group 1 Semester 2026-2 12 Feb 2026

#### Quiz #1

A

Name: \_\_\_\_\_

Student ID: \_\_\_\_\_

**P.1. (50%)** Let  $\Sigma = \{0, 1, 2\}$  and consider the language

$$L = \{w \in \Sigma^* \mid w \text{ has length exactly 2 and ends with 2}\}.$$

- a) List all strings in  $L$ .
- b) Write five different strings in  $\Sigma^*$  that are not in  $L$  (explain why). Does  $\varepsilon \in L$ ?
- c) Is  $L$  finite or infinite? Justify briefly using the definition of  $\Sigma^*$ .

**P.2. (50%)** Let  $\Sigma = \{a, b\}$  and  $L = \{ab, ba\}$ .

- a) Compute explicitly  $L^2$  and  $L^3$  (write all strings, without repetitions).
- b) For each of the following strings, indicate whether it belongs to  $L^2$ ,  $L^3$ ,  $L^4$ , or to none of these:

*abab, abba, baab, ababab, baabba.*

Justify each answer by expressing the string (or not) as a concatenation of elements of  $L$ .

- c) Can the string  $w = (ab)^4$  belong to  $L^3$ ? Explain why or why not.



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#### Quiz #1

B

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Student ID: \_\_\_\_\_

**P.1. (50%)** Let  $\Sigma = \{a, b, c\}$  and consider the language

$$L = \{w \in \Sigma^* \mid w \text{ starts with } a \text{ and has length at most 3}\}.$$

- a) List all strings in  $L$ .
- b) Give three different strings in  $\Sigma^*$  that do not belong to  $L$ , and explain why. Does  $\varepsilon \in L$ ?
- c) Is  $\varepsilon$  in  $L$ ? Is  $\varepsilon$  in  $\Sigma^*$ ? Justify both answers.

**P.2. (50%)** Let  $\Sigma = \{0, 1\}$  and  $L = \{01, 10, 11\}$ .

- a) Compute explicitly  $L^2$  (all concatenations of two strings from  $L$ ).
- b) For each of the following strings, determine whether it belongs to  $L^2$ ,  $L^3$ , or to none of them. Show a factorization when it belongs.

*0110, 1110, 1011, 010110, 111111.*

- c) Is it possible for a string of odd length to be in  $L^4$ ? Explain your reasoning.