

Teoria da Computação

MIEI 2018/2019 - FCT UNL

Aula Prática 7

Regular Expressions

1. Define a regular expression over the alphabet $\Sigma = \{X\}$ that denotes the set of words over Σ of:
 - (a) even length;
 - (b) odd length.

2. Consider the following alphabet.

$$DIGITS \stackrel{\text{def}}{=} \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

Define a regular expression over *DIGITS* that denotes the language of all 4-digit pins.

3. Consider the alphabet

$$DNA \stackrel{\text{def}}{=} \{A, T, C, G\}$$

Define a regular expression over that alphabet which defines the language over it of all words that contain at least one occurrence of **ACT** as a substring.

4. Recall the alphabet

$$\Sigma = \{ \text{insertcard,} \\ \text{pin,} \\ \text{checkbalance,} \\ \text{withdraw,} \\ \text{moreops,} \\ \text{retrievecard} \}$$

Using a regular expression over Σ , define the language of valid interaction traces between a user and an ATM, considering that **moreops** and **retrievecard** are only available after **checkbalance** or **withdraw**.

5. Consider the alphabet $\Sigma = \{a, b, c\}$.

Check if the following words belong to the language denoted by the regular expression $(a + b)^*(ab + bc)^*$ over Σ .

- (a) ε
- (b) *ababbc*
- (c) *bcbca*
- (d) *bcbcab*
- (e) *bbbaaabc*
- (f) *bbbaaaba*
- (g) *bbbabcba*

6. Define a regular expression over the alphabet $\Sigma = \{a, b, c\}$ that denotes the set of words over Σ that:
- (a) begin and end with the same element;
 - (b) have an even number of b 's whenever they begin with an a ;
 - (c) end with c , begin with a or b , and have an odd number of c 's;
 - (d) do not have consecutive b 's.