# Práctica 1: Lenguajes

2do cuatri 2024 - si encontrás algún error mi tg es @kztqz

## Ejercicio 1

Sea $\Sigma = \{a,\ b\}$ un alfabeto. Hallar:

$$\Sigma^0, \quad \Sigma^1, \quad \Sigma^2, \quad \Sigma^*, \quad \Sigma^+, \quad |\Sigma|, \quad |\Sigma^0|$$

- $\Sigma^0 = \{\lambda\}$
- $\Sigma^1 = \Sigma = \{a, b\}$
- $\Sigma^2 = \{aa, ab, ba, bb\}$
- $\Sigma^* = \bigcup_{i \geq 0} \Sigma^i = \{\lambda, a, b, aa, ab, ba, bb\}$
- $\Sigma^+ = \bigcup_{i \geq 1} \Sigma^i = \{a, b, aa, ab, ba, bb\}$
- $|\Sigma| = 2$
- $|\Sigma^0| = 0$

## Ejercicio 2

Decidir si, dado $\Sigma = \{a,\ b\}$ vale:

$$\lambda \in \Sigma, \quad \lambda \subseteq \Sigma, \quad \lambda \in \Sigma^+, \quad \lambda \in \Sigma^*, \quad \Sigma^0 = \lambda, \quad \Sigma^0 = \{\lambda\}$$

- $\lambda \in \Sigma \rightarrow Falso$
- $\lambda \subseteq \Sigma \rightarrow Falso$
- $\lambda \in \Sigma^+ \rightarrow Falso$
- $\lambda \in \Sigma^* \rightarrow Verdadero$
- $\Sigma^0 = \lambda \rightarrow Falso$
- $\Sigma^0 = \{\lambda\} \rightarrow Verdadero$

## Ejercicio 3

Sea $\alpha = abb$ una cadena. Calcular:

$$\alpha^0, \quad \alpha^1, \quad \alpha^2, \quad \alpha^3, \quad \prod_{k=0,\ldots,3} \alpha^k = \alpha^0.\alpha^1.\alpha^2.\alpha^3, \quad \alpha^r$$

- $\alpha^0 = \lambda$
- $\alpha^1 = abb$

- $\alpha^2 = abb.abb$
- $\alpha^3 = abb.abb.abb = abbabbabb$
- $\prod_{k=0,\ldots,3} \alpha^k = \alpha^0.\alpha^1.\alpha^2.\alpha^3 = \lambda.abb.abbabb.abbabbabb = abbabbabbabbabbabb$
- $\alpha^r = (abb)^r = bba$

## Ejercicio 4

Sean las cadenas $\alpha = abb$ y $\beta = acb$. Calcular:

$$\alpha\beta, \quad (\alpha\beta)^r, \quad \beta^r, \quad \beta^r\alpha^r, \quad \lambda\alpha, \quad \lambda\beta, \quad \alpha\lambda\beta, \quad \alpha^2\lambda^3\beta^2$$

- $\alpha\beta = abbacb$
- $(\alpha\beta)^r = (abbacb)^r = bcabba$
- $\beta^r = (acb)^r = bca$
- $\beta^r\alpha^r = (acb)^r(abb)^r = bcabba$
- $\lambda\alpha = \alpha = abb$
- $\lambda\beta = \beta = acb$
- $\alpha\lambda\beta = \alpha\beta = abbacb$
- $\alpha^2\lambda^3\beta^2 = \alpha^2\beta^2 = abbabbacbacb$

## Ejercicio 5

Dado un alfabeto $\Sigma$, sean $x,y \in \Sigma$ y $\alpha, \beta \in \Sigma^*$. Demostrar que: