Lecture 11

Friday, February 2, 2024 11:36 AM

Last Quiz: Q1A

If A regular $\overset{?}{\Longrightarrow}$ $\forall B \subset A$ is regular?

$\overset{?}{\Longrightarrow}$ $\forall B \supset A$ " " ?

If A is not regular $\overset{?}{\Longrightarrow}$ $\forall B \subset A$ is not regular

$\overset{?}{\Longrightarrow}$ $\forall B \supset A$ " " " .

All false!!!

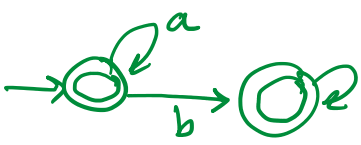
non-regular set:

$\{a^n b^n : n \geq 0\} = \{\varepsilon, ab, aabb, aaabbb, \ldots\}$

$\{x \in \{a,b\}^* : x \text{ is a "palindrome"}\}$

Example:

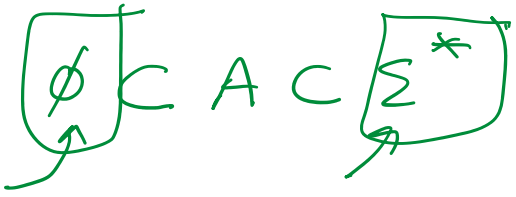
$A = \{a^m b^n : m, n \geq 0\}$ aaaabbb

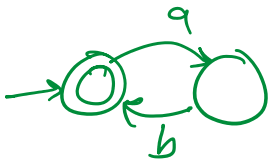


NFA

$\rightarrow B = \{a^n b^n : n \geq 0\}$, $B \subset A$

$A = \Sigma^* = \{a,b\}^*$

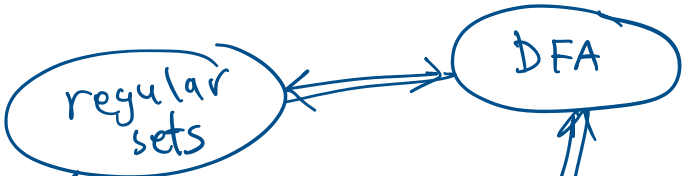


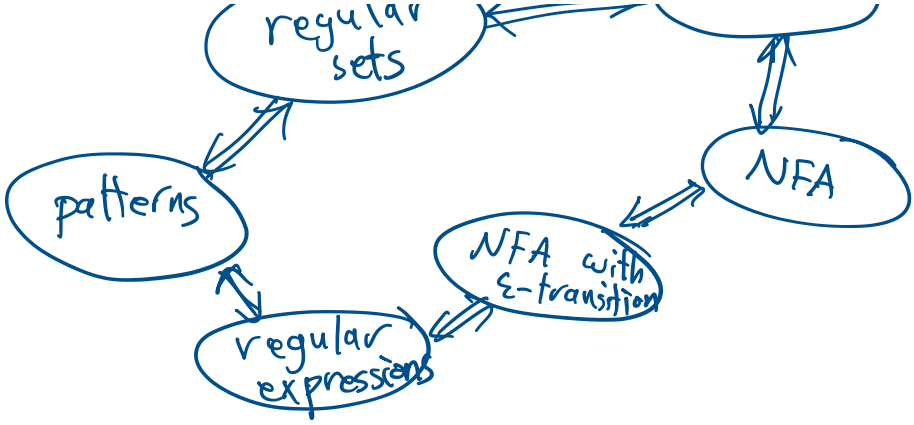


a b a b

If A and B are regular sets

then so is $AB = \{xy : x \in A, y \in B\}$





Pattern Matching

rm *.txt

grep "hel.*ld" a.txt

some kind of pattern

* Each pattern represents a set: all strings that match the pattern.

Book's Notation for Patterns

* Atomic Patterns

* $a \in \Sigma$ $L(a) = \{a\}$
* ε $L(\varepsilon) = \{\varepsilon\}$
* $\emptyset$ $L(\emptyset) = \emptyset$
* # $L(\#) = \Sigma$
* @ $L(@) = \Sigma^*$

* Compound Patterns

($\alpha, \beta, \gamma, \ldots$ are used for patterns)

* $\alpha + \beta$ $\quad L(\alpha+\beta) = L(\alpha) \cup L(\beta)$
* $\alpha \cap \beta$ $\quad L(\alpha \cap \beta) = L(\alpha) \cap L(\beta)$
* $\alpha\beta$ $\quad L(\alpha\beta) = L(\alpha)\,L(\beta)$
* $\sim\alpha$ $\quad L(\sim\alpha) = \Sigma^* - L(\alpha)$
* α^* $\quad L(\alpha^*) = L(\alpha)^*$
* α^+ $\quad L(\alpha^+) = L(\alpha)^+$

Example: $\Sigma = \{a, b\}$

* $\alpha = @a@a@$

$L(\alpha) = \{ x \in \{a,b\}^* : \#a(x) \geq 2 \}$

* $\alpha = \# \cap \sim a$