Sept 14

COMPSCI 3331

Fall 2022

What's next?

- Change to grading (+1%)
- Assignment 1: out by Sept 27 (at the latest), due Oct 11.
- Quiz 1: Sept 28

Alphabets, Letters, Words, Languages

- Alphabet
- Letters
- Words
- Language

Sigma = {a, b, c}

w = ...

$w = aabaaa$

ε - empty word

$L \subseteq \Sigma^*$

$L_1 = \{\varepsilon, ab, aa\}$

$L_2 = \phi$

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

$$\Sigma^* = \{\varepsilon, a, b, aa, ab, ba, bb,$$
$$aaa, aab, aba, abb, \ldots\}$$

$$L = \{\varepsilon, a, ab, bb, aab, abaa, \ldots\}$$

do not = donot

Word Operations

- ε is the empty word.
- concatenation: all letters of first word, followed by all letters of the second word.
- reversal: all words in reverse order.
- $|w|$ length of w.
- $|w|_a$ number of occurrences of a in w.
- w^n

Reversal

- Inductive definition.
- Proof of $(xy)^R = y^R x^R$?

Word equations

- Suppose x, w are words with $xw = wx$.
- Happens when x, w are equal.
- Does it happen any other time?

- Generalization: what if x, w, z are words with $xz = zw$?

Languages

- Languages are sets of words.

Languages

Which of the following is not a language over $\Sigma = \{a, b\}$?

- $\{a\}$
- $\{a, b, aa, bb, aabc, aaba, aaab, aaaba\}$
- $\{a, \{aa, bb\}, aaaa\}$
- $\{w \ : \ |w|_a > |w|_b\}$
- $\{a, b\}^*$

For next time...

- Finish Lecture 2 - Languages (Language Operations)
- First part of Lecture 3 - Regular Languages.