Oct 11

COMPSCI 3331

Fall 2022

What's next?

- Quiz 2 grades not available yet, solution available.
- Assignment 1: due TONIGHT at 11:59 PM
- Assignment 2: available by end of day today, due Oct 26.
- Quiz 3: tomorrow, end of Lecture 6.
- Midterm: October 25.

Closure Properties

- Easy: use regular expressions to show that regular languages are closed under concatenation, Kleene star and union.
- What about intersection, reversal, complement?

Intersection

Complement

Showing languages aren't regular

- Intuition: does this language take a lot of memory?

Showing languages aren't regular

- Language B of "balanced parentheses". $\Sigma = \{(,)\}$.
- Every open parenthesis is matched with a closing parenthesis, no extra parentheses.
- So $B = \{x \in \Sigma^* \ : \ |x|_(= |x|_) \text{ and } \forall \text{ prefixes } y \text{ of } x, |y|_(\geq |y|_)\}$

Showing languages aren't regular

Showing languages aren't regular

- $L_1 = \{a^n b^m \ : \ n \neq m\}$.
- $L_2 = \{w\#y \ : \ w, y \in \{a,b\}^*, |w| < |y|\}$ $(\subseteq \{a,b,\#\}^*)$
- $L_3 = \{w\#y \ : \ w, y \in \{a,b\}*, |w|_a = |y|_b\}$.
- $L_4 = \{w\#y \ : \ w, y \in \{0,1\}^*, w < y$ as binary numbers. $\}$.

Showing languages aren't regular

- $L_5 = \{w \in \{a,b,c,d\}^* \ : \ \forall x \in \{a,b,c,d\}, |w|_x = 0 \text{ or } |w|_x \geq 5\}$
- $L_6 = L^*$ where $L = \{a^n b^n \ : \ n \geq 0\}$
- $L_7 = \{w \in \{a,b\}^* \ : \ |w|_a \equiv |w|_b (\text{ mod } 10)\}$