CIT 596 Recitation, Week 3

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Feb 7, 2014

[Exercise] @sipser13 [p. 85] exercise 1.14

- Show that if M is a DFA that recognizes language B, swapping the accept and nonaccept states in M yields a new DFA recognizing the complement of B. Conclude that the class of regular languages is closed under complement.
- Show by giving an example that if M is an NFA that recognizes lnaguage C, swapping the accept and nonaccept states in M doesn't necessarily yield a new NFA that recognizes the complement of C. Is the class of languages recognized by NFAs closed under complement? Explain your answer.

[Exercise] @sipser13 [p. 86] exercise 1.19

Convert the following regular expressions to nondeterministic finite automata.

- $(0 \cup 1)^*000(0 \cup 1)^*$
- $(((00)^*(11)) \cup 01)*$
- $\emptyset^*$

[Exercise] @sipser13 [p. 86] exercise 1.20

Convert the following regular expressions to nondeterministic finite automata.

- a^*b^*
- $a(ba)^*b$
- $a^* \cup b^*$
- $(aaa)^*$
- $\Sigma^*a\Sigma^*b\Sigma^*a\Sigma^*$
- $aba \cup bab$
- $(\epsilon \cup a)b$
- $(a \cup ba \cup bb)\Sigma^*$

[Exercise] @sipser13 [p. 88] exercise 1.28

Conver the following regular expressions to NFAs. In all parts, $\Sigma = \{a, b\}$.

- $a(abb)^* \cup b$
- $a^+ \cup (ab)^+$
- $(a \cup b^+)a^+b^+$

[Exercise] @sipser13 [p. 87] exercise 1.22

In certain programming languages, comments appear between delimiters such as /# and #/. Let C be the language of all valid delimited comment strings. A member of C must begin with /# and end with #/ but have no intervening #/. For simplicity, assume that the alphabet for C is $\Sigma = \{a, b, /, \#\}$.

- Give a regular expression that generates C.
- Give a NFA that recognizes C.

[Exercise] @sipser13 [p. 90] exercise 1.45

- Let $A/B = \{w | wx \in A \text{ for some } x \in B\}$. Show that if A is regular and B is any language, then A/B is regular.