CPSC 421: Introduction to Theory of Computing **Winter Term 1 2018-19**

Lecture 7: September 19

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7.1 Limitations of FA

- Only read input once, left to input
- Only finite memory

7.2 Push Down Automata (PDAs)

Basically, NFA with infinite stack (DFA + stack).

It turns out:

- NFA + queue $\equiv$ Turing Machine
- NFA + 2 stacks $\equiv$ Turing Machine

Transitions of NFA now become: If in state q and see symbol a (or ϵ) in input, and see σ on stop of stack (or ignore it) then pop it, push c onto the stack (or ϵ) goto state q' (if no transition $\rightarrow$ implicit reject).

Example (2.14 in text)

$L = \{0^n 1^n : n \geq 0\}$ This is not regular.

Exercise: $L = \{a^i b^j c^k : i, j, k \geq 0 and i = j \text{ or } i = k\}$

Hints:

1. Need nondeterminism
2. L contains both $aabccc$ $(i = k)$ and $aabbc$ $(i = j)$