

Lecture 1

chapter 1 - discrete math review

- graph theory
- set theory

chapter 2 - Deterministic finite Automata (DFA)

- feed machine an input string, it gives back an output string
- accept state (double circle)
- if im not there, the machine rejects the input string

applications

- represent gates
- lexical analysis

chapter 3 - regular expressions

- strings that expand to a set of strings
- operators: or $|$, concatenation $.$, star $*$
- $a \mid b \rightarrow \{a, b\}$
- $a . b \rightarrow \{ab\}$
- $a^* \rightarrow \{\text{empty string}, a, aa, aaa, \dots\}$

chapter 4

chapter 5 - context free grammars

ϵ is the empty string (length 0)

- $S \rightarrow AB$
- $A \rightarrow Aa \mid \epsilon$
- $B \rightarrow Bb \mid \epsilon$
- start symbol
- parse string
- production rules
- $S \rightarrow AB \rightarrow ABb \rightarrow Bb \rightarrow b$
- accepts any string such that you can derive the string from the start symbol
- used in parser

chapter 6 - pushdown automata

- finite state machine with a stack

- transition states based on input and store memory

chapter 7 - turing machines

'hardware'

- tape
- input string on tape
- infinite tape
- read/write head

'software'

- transition function
- set of rules i have to follow to move across this tape
- transition function gets complex (can represent any algo)