

Theory of Computation, CSCI 438 spring 2022
Exam 1 review, Feb. 11

Regular Languages

- Know the definition of a DFA.
- Be able to convert:

Conversion	Using What
Picture \Rightarrow $M=(...)$, i.e. the formal definition	Definition
Picture \Leftarrow $M=(...)$	

- Be able to convert:

Language description \Rightarrow DFA	Problem solving
Language description \Leftarrow DFA	

- Know the signature of δ^* for a DFA and be able to use it to define what it means for a DFA to accept a string, and therefore for the DFA to recognize a language
- Know the definition of a regular language
- Be able to prove that regular languages are closed under complementation, union and intersection

Nondeterminism

- Know the definition of an NFA
- Be able to convert:

DFA \Rightarrow NFA	Theorem: A language is regular iff some NFA recognizes it
DFA \Leftarrow NFA	

- Be able to prove that a language is regular iff some NFA recognizes it.
- Be able to prove closure of regular languages under concatenation and star-closure

Regular Expressions

- Know the definition of regular expressions
- Know situations where regular expressions are used
- Be able to convert:

Language description \Rightarrow Reg-ex	Problem solving
Language description \Leftarrow Reg-ex	

- Be able to convert:

NFA \Rightarrow Reg-ex	Problem solving. Once you have a solution you could prove that your solution works via induction on the length of the string, but I won't ask you to do this.
NFA \Leftarrow Reg-ex	

- Know the pumping lemma for regular languages and be able to prove that a language is not regular using the pumping lemma for regular languages