

Tentative Homework Problems CS 161

Languages

Chapter 2

Problems 1, 2, 5, 6, 7, 11

Definitions:

- alphabet; language; word
- Kleene closure (*), positive Kleene closure (+)
- Kleene closed
- reverse, PALINDROME(X)
- equivalence relation (from Rosen)

Regular Languages

Chapter 4

Problems 2, 4, 5, 9, 16

Definitions:

- regular expression
- product language
- language associated with a regular expression

Theorems:

- finite languages are regular

Chapter 5

Problems 3,5,9,17

Definitions:

- finite automaton
- language accepted by a finite automaton

Chapter 6

Problems 2, 6, 8-13, 17

Definitions:

- transition graph
- language accepted by a transition graph
- generalized transition graph
- language accepted by a generalized transition graph

Chapter 7

Theorems: Kleene's Theorem

You are not responsible for the proof of Kleene's Theorem, but do learn the algorithm to transform a generalized transition graph into a regular expression.

Problem 1

Chapter 9

Problems 1, 3, 5, 18, 20

Theorems: closure properties including intersection, complement, star, union, product

Chapter 10

Problems 1, 3, 4, 6, 15: use the pumping **idea** as illustrated in class
Problem 19(ii)

Know the statement of the Pumping Lemma
Be able to use the pumping **idea** to prove nonregularity

Context-free Languages

Chapter 12

Problems 1,2,3 — formal proof not needed,
7,15,16

Definitions:

context-free grammar
language generated by a CFG
context-free language
ambiguous CFG

Skills:

using parse trees and total language trees

Chapter 13

Problems 1, 3-7

Definitions:

regular grammar

Theorems: If L is regular then L is context-free.

Chapter 14

Problems 1, 3, 4, 12, 13

Chapter 15

Problems 1, 2, 3, 4

Theorems:

There is a context-free grammar for a language L
if and only if there is a PDA accepting L .

You do not need to learn the algorithm for PDA \rightarrow CFG
You do need to learn CNF \rightarrow PDA

Chapter 16

Problem 18

Definitions: nonterminal self-embedding pair

Theorem 35

You need to be able to use Theorem 35 to prove that a language is not context-free

Chapter 17

Problem 9

Theorems about closure: union, product, star, intersection, complement