Tentative Homework Problems
CS 161

Languages

Cohen Chapter 2: 1, 2, 5, 6
Linz Chapter 1: 1, 3, 5, 6, 7, 8, 11

Definitions:

alphabet; language; word
Kleene closure (*), positive Kleene closure (+)
Kleene closed
product language
reverse, PALINDROME(X)

Regular Languages

Chapter 4

Problems 2, 4, 5, 9, 16

Definitions:

regular expression
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

Problem 1

Chapter 9

Problems 1, 3, 5, 18, 20

Theorems:
closure properties including intersection, complement, Kleene closure, 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 --> CFG
You do need to learn CNF --> 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. Kleene closure, intersection, complement