

CS U390, Spring 2007 (Instructor: Clinger)

Homework 2

Assigned: Monday, 29 January 2007

Due: Monday, 5 February 2007

Good students should get at least 40 of the 60 possible points.

1. [8 pts] Do exercise 2.1 (all eight parts) in the textbook.
2. [10 pts] Do exercise 2.2 (both parts) in the textbook.
3. [5 pts] Do exercise 2.14 in the textbook.
4. [5 pts] Do exercise 2.15 in the textbook.
5. [10 pts] Do exercise 2.16 in the textbook.
6. [16 pts] For each of the following languages, give a context-free grammar with alphabet  $\{0, 1\}$  that recognizes the language.
  - (a)  $\{1, 10, 11, 100\}$
  - (b)  $\{w \mid w \text{ contains at most three 0s}\}$
  - (c)  $\{w \mid w \text{ is a binary numeral divisible by 3}\}$
  - (d)  $\{w \mid w \text{ is a binary numeral divisible by 7}\}$
  - (e)  $\{w \mid w \text{ contains an even number of 0s and an even number of 1s}\}$
  - (f)  $\{w \mid w \text{ contains at least twice as many 0s as 1s}\}$
  - (g)  $\{w \mid \text{there exist strings } x, y, \text{ and } z \text{ such that } z \text{ is the reverse of } x \text{ and } w = xyz\}$
  - (h) the complement of  $\{0^n 1^n \mid n \in \mathcal{N}\}$
7. [6 pts] Do problem 2.27 (both parts) in the textbook.