

CS U390, Spring 2007 (Instructor: Clinger)

Homework 3

Assigned: Thursday, 15 February 2007

Due: Thursday, 22 February 2007

Good students should get at least 25 of the 40 possible points.

1. [5 pts] Do exercise 2.6b in the textbook.
2. [5 pts] Do exercise 2.6d in the textbook.
3. [5 pts] Do exercise 2.13 in the textbook.
4. Prove that the following languages are context-free:
  - (a) [5 pts]  $\{0^m 1^{m+n} 0^n \mid m, n \geq 0\}$
  - (b) [5 pts]  $\{0^i 1^n 0^j 1^n 0^k \mid i, j, k, n \geq 0\}$
  - (c) [5 pts]  $\{w \mid w \in \{0, 1\}^* \text{ and } w \text{ contains the same number of 0s as 1s}\}$
  - (d) [5 pts]  $\{w \mid w \in \{0, 1\}^* \text{ and } w \text{ contains twice as many 0s as 1s}\}$
5. [5 pts] Prove that the following CFG is unambiguous:

$$E \rightarrow T \mid E + T$$

$$T \rightarrow 0 \mid ( E )$$