

CS 3800, Fall 2017
Homework 9 (40 points)
Assigned: Monday, 13 Nov 2017
Due: Monday, 20 Nov 2017

1. [10 pts] Answer each part TRUE or FALSE.
 - (a) $5n \in O(n)$
 - (b) $3n^2 \in O(n)$
 - (c) $4n^2 \in O(n \lg n)$
 - (d) $7n \lg n \in O(n^2)$
 - (e) $3^n \in O(2^n)$
2. [10 pts] The textbook proves Theorem 4.7 (A_{CFG} is decidable) by describing an algorithm that decides A_{CFG} . Analyze that algorithm and explain why it does or doesn't run in polynomial time (as a function of the size of the grammar).
3. [10 pts] The textbook proves Theorem 4.8 (E_{CFG} is decidable) by describing an algorithm that decides E_{CFG} . Analyze that algorithm and explain why it does or doesn't run in polynomial time (as a function of the size of the grammar).
4. [10 pts] Show that $\{\langle w_1, w_2 \rangle \mid w_1 \text{ is a substring of } w_2\}$ is in P.