Revision: Week 3

Due: 5pm on 2nd Sept.

Instructions

- Discussion is allowed and infact encouraged
- Answers **must** be written by yourself.
- All sources (including discussions) that are used to reach the solution must be mentioned.

Argue Correctness = Describe what each of the states / rules are supposed to be doing and why they do that.

(1) Give a CFG that generates the foll. language over $\{0,1\}$.

$\{ w : w$ has odd length and starts & ends with the same symbol$\}$

Argue correctness.

Also give an example of a string in this language and show the parse tree corresponding to its derivation

using your grammar. [3 + 2 + 1/2 + 1 1/2]

(2) Convert the following CFG into one in Chomsky Normal Form.

$$A \to BAB \mid B \mid \varepsilon$$
$$B \to 00 \mid \varepsilon$$

[4]

(3) Construct a PDA for the following language.

The complement of $\{a^n b^n : n \geq 0\}$

Argue correctness. [2 + 2].

(4) Use the pumping lemma to show that the following language is not context-free: $\{0^n 1^n 0^n 1^n : n \geq 0\}$.

[5].