Homework Assignment 6

Due **Friday 12-03-04**

1. Define a Non-Deterministic Finite State Automaton N on the alphabet $A = \{\texttt{l}, \texttt{m}, \texttt{x}\}$ which accepts exactly those words on A ending with the keywords `xml` or `mll`. Define a Deterministic Finite State Automaton M equivalent to N and such that the number of states of M is not greater than 7.

(*5 points*)

2. (i) Define a Finite State Machine M with input alphabet $A = \{0, 1\}$ and output alphabet $\{0, \ldots, 5\}$ such that M reads a word w as the binary representation of a number n *mod* 6 and prints the value of n.

(*3 points*)

(ii) Define a Finite State Automaton M on the alphabet $A = \{0, 1\}$ which accepts a word w if and only if w is the binary representation of a number divisible by 6, (e.g., 000110 or 1100). Find a minimal M' equivalent to M.

(*3 points*)

3. Let $A = \{0, 1\}$. Define a context-free grammar that generates precisely the language

$$\mathcal{L} = \{0^n 1 0^n \mid n \geq 1\}$$

Is it possible to define a deterministic pushd-down automaton which accepts precisely $\mathcal{L}$?

(*4 points*)