Course 2BA1: Hilary Term 2008.

Assignment III.

To be handed in by Wednesday 13th February, 2008.
Please include both name and student number on any work handed in.

1. (a) Describe the formal language over the alphabet $\{0, 1\}$ generated by the context-free grammar whose only non-terminal is $\langle S \rangle$, whose start symbol is $\langle S \rangle$ and whose productions are the following:

$$\begin{aligned} \langle S \rangle &\rightarrow 0 \\ \langle S \rangle &\rightarrow 1\langle S \rangle 1 \end{aligned}$$

(i.e., describe the structure of the binary strings generated by the grammar). Is this context-free grammar a regular grammar?

(b) Devise a regular grammar to generate the language over the alphabet $\{0, 1\}$ whose words consist of a single 1, followed a string of 0's, where the number of such 0's is strictly positive and is a multiple of 4.

(c) Give the specification of a finite state acceptor that accepts the language specified in (b). (In particular you should specify the set of states, the starting state, the finishing states, and the transition table that determines the transition function of the finite state acceptor.)