

Sample Assignment # 3.1

Present a transition diagram for a DFA that recognizes the set of binary strings that start with a 1 and, when interpreted as entering the DFA most to least significant digit, each represents a binary number that is divisible by seven. Thus, 111, 1110 and 10101 are in the language, but 110, 1001 and 11000 are not.

Construction:

I can do on board, but this is a simple variant of one I already did. It must have an extra start state to guarantee a 1 is leftmost symbol. There are then seven more states, labeled M_0 to M_6 for the value mod 7. M_0 is final, M_i goes to $M_{2i \bmod 7}$ on a 0 and to $M_{2i+1 \bmod 7}$ on a 1. The start state goes to M_1 .

Sample Assignment # 3.2

- a.) Present a transition diagram for an NFA for the language associated with the regular expression $(1101 + 110 + 11)^*$. Your NFA must have no more than four states.
- b.) Use the standard conversion technique (subsets of states) to convert the NFA from (a) to an equivalent DFA. Be sure to not include unreachable states. Hint: This DFA should have no more than seven states.

