

CSC448/2405 Fall 2016 Homework Assignment 1

due Tuesday, September 20, 2016

Let $n \in \mathbb{Z}^+$ and let $F_n \subseteq \{0, 1, 2, 3, 4\}^*$ be defined as follows:

$$F_n = \{30^{i_1}10^{i_2}1 \cdots 10^{i_n}2^k 0^{i_k}4 \mid 1 \leq k, i_1, \dots, i_n \leq n\}.$$

1. Describe a 2-way DFA with $O(n)$ states that accepts F_n .
Briefly explain how it works, why it has $O(n)$ states, and why the language it accepts is F_n .
2. Prove that any DFA that accepts F_n has at least n^n states.