York University   EECS 2001   May 27, 2015

Homework Assignment #2
Due: June 3, 2015 at 7:00 p.m.

1. Egbert is designing an web interface to access the Leutonian National Library. The web site will require registered users to choose a password. A password is a string of characters that are either Leutonian letters or Leutonian digits. The set of Leutonian letters is $\{k, z, c, v\}$. (Since they lack vowels, Leutonian words are notoriously difficult for non-native speakers to pronounce.) Leutonians use the same decimal numbering scheme that we do, so their digits are 0 to 9.

To make passwords harder to guess, Egbert comes up with the following rules for legal passwords.

- A password must contain at least one Leutonian digit.

- The length of the password must be at least 3.

- No letter can appear after a digit.

- A v must never appear immediately after a c. (This would spell out a very bad Leutonian swear word.)

For example, kczv78 and 791 are legal passwords, but 5k, vvvvv and kcvk99 are not.

(a) Design a deterministic finite automaton that accepts a string if and only if it is a legal password. You may assume the input alphabet is the set of all Leutonian letters and digits. Use as few states as possible.

Hint: it is possible to use fewer than 15 states.

(b) For each state of the automaton you drew in part (a), describe, in English, exactly which strings take the automaton to that state. (You do not have to prove your answer is correct.)