

CECS 329, Homework Assignment 4, Fall 2025, Dr. Ebert

Directions: Please review the Homework section on page 6 of the syllabus including a list of all rules and guidelines for writing and submitting solutions.

Due Date: Thursday, October 23rd as a PDF-file upload to the HW4 Canvas dropbox.

Problems

1. **Recognizing “Classic” SSN’s.** Before the Social Security Administration began randomizing social security numbers in 2011, the “classic” social security number took the form

a-g-s,

where $a, g, s \in \{0, 1, \dots, 9\}^*$, a is a three-digit *area* word, g is a two-digit *group* word, and s is a four digit *serial* word. Moreover, $a \neq 000$, $g \neq 00$ and $s \neq 0000$. Finally, when viewed as a number it must be the true that $a \leq 772$ and a cannot lie within the interval $[734, 749]$.

- (a) Provide the state diagram of an NFA N that accepts the language of all classic SSN’s. Assume all words are over the alphabet is $\{-, 0, 1, \dots, 9\}$. Hint: use the notation $a : b$ to denote the range of digits from a to b . For example, an edge labeled with $1 : 6$ is equivalent to an edge labeled as $1, 2, 3, 4, 5, 6$.
(25 pts)
- (b) Show the computation of N on inputs i) 217-34-9218, ii) 740-49-8734, and iii) 641-00-5923.
(10 pts)
- (c) Provide a regular expression whose associated language is the set of all classic SSN’s. Again you may use colon notation of the form $[a : b]$ which in this case is equivalent to the set of numbers $\{a, a + 1, \dots, b\}$. (15 pts)