

HOMEWORK #1

CS490M-12/CS580R-1

Feb. 22, 2005

Due date: Tue., March 1, 5 PM (hard copy). See syllabus for rules. You can draw the diagrams by hand, but *make them legible and provide some explanation*. No cheating! (If your diagram is incomprehensible, I will ignore it. And if you have exactly the same machine with exactly the same explanation as your friend, I will attempt to calculate the probability of that happening without collusion.)

1. Write a FSA that accepts exactly the set of strings that start with b and end with b. Assume the set of possible input characters = the alphabet. You can use aggregate terms like ‘other’ on your arcs.
2. Write a FSA that accepts exactly the set of strings that start with b, contain at least one b in the middle, and end with b. Same input as above.
3. Now assume the input = the alphabet + the blank character. Write a FSA that accepts exactly the set of strings that contain the word ‘grotto’ and the word ‘raven’. The words may occur in either order. Note that to be considered a word, a substring must be preceded and followed by a blank or beginning of input or end of input.
4. Problem 2.3 in book for whole dollars only (ignore cents).
5. Consider the following grammar:

1. S → NP VP
2. VP → V NP PP
3. VP → V NP
4. VP → V
5. NP → NP PP
6. NP → det N
7. NP → N
8. PP → prep NP
9. V → saw
10. prep → in | with (rules 10a & 10b)
11. det → the
12. N → boy | man | park | telescope (rules 12a-12d)

- a) Develop a finite-state machine that will accept the same sentences as this grammar.
- b) Show that your FSM will accept the sentence

The boy saw the man in the park with the telescope.

by showing what state it is in after reading each word.

6. Study the Soundex algorithm in the textbook on p. 89 (ex. 3.6). What is the Soundex code for your name? What are two or three misspellings of your name that you have seen? What are their Soundex codes?

The purpose of the Soundex code is to give the same code for common misspellings of names, but it was developed with names of European origin in mind (erroneously called “Western,” which is silly, since none of the native languages of the Western Hemisphere were included). The purpose of this exercise is to try it on a greater variety of names.