

Homework 1

Cpt S 317, Spring 2009

Due Date: January 28, 2009

Total points: 35

For all questions that ask you to design a DFA or NFA, make sure you provide the full 5-tuple description $(Q, \Sigma, \delta, q_0, F)$ along with the state diagrams.

1. (10 points)

Exercise 2.2.4: parts a and b.

2. (5 points)

Give a DFA for the following language over the alphabet $\Sigma = \{0, 1\}$:

$L = \{ w \mid w \text{ has a } 0 \text{ in its } 2^{nd} \text{ last position} \}$

3. (5 points)

Give a DFA for the following language over the alphabet $\Sigma = \{0, 1, 2\}$:

$L = \{ w \mid \text{the sum of the symbols in } w \text{ is a multiple of } 3 \}$

For example, 021201 is part of the language because the sum of all its symbols equals 6 ($6 \bmod 3 = 0$). Whereas, 010012 is not because its sum is 4 ($4 \bmod 3 = 1$).

4. (5 points)

Give a DFA for the following language over the alphabet $\Sigma = \{0, 1\}$:

$L = \{ w \mid w \text{ contains the substring } 001 \}$

5. (5 points)

Give a DFA for the following language over the alphabet $\Sigma = \{0, 1\}$:

$L = \{ w \mid \text{every odd position in } w \text{ is a } 1 \}$

6. (5 points)

Give a DFA for the following language over the alphabet $\Sigma = \{0, 1\}$:

$L = \{ w \mid w \text{ starts with } 0 \text{ and has even length, or starts with } 1 \text{ and has odd length} \}$