

Test 1 Review

CS-450

April 25, 2013

1 AFSA

Question 1:

- a) Design a AFSA for $x \in \{0,1\}^*$ — x has a 0 fourth from the end and x represents in binary an integer evenly divisible by 3
- b) Construct the computation tree for m on 10101

Question 2:

- a) Design a AFSA for $x \in \{0,1\}^*$ — x does not have a 0 fourth from the end and x represents in binary an integer that doesn't evenly divisible by 3
- b) Computation tree for m on 10101

Question 3:

- a) Design AFSA $L = \{x \in \{0,1\}^*\}$, x represents in binary evenly divisible by 15.
- b) Design $L_2 = L_1'$

Question 4:

Let $M_1 = \{x \in \{0,1\}^* \mid x \text{ begins or ends with } 00\}$

Let $M_2 = \{x \in \{0,1\}^* \mid x \text{ has both } 00 \text{ and } 11 \text{ as substring}\}$

a) Design AFSA $M_3 = M_1 \cap M_2$.

b) Design AFSA $M_4 = M_1 \cup \bar{M}_2$

c) Design AFSA $M_5 = \bar{M}_3$

Question 5:

Convert the AFSA to DFSA

M	0	1
1	$2 \wedge 3$	1
2	$3 \vee 4$	$2 \vee 4$
3	$3 \vee 1$	3
4	$1 \wedge 4$	$2 \wedge 3$

The initial state is 1, and the final state is also 1

Question 6

Given the AFSA, where 1 is the initial state, and 1 and 3 are final states

M	0	1
1	1	$1 \vee 3$
2	$2 \wedge 4$	$3 \wedge 4$
3	3	4
4	$2 \vee 3$	$1 \vee 4$

a) Draw the computation tree for string 101100 and explain if it is an accepting computation

b) Convert M to its equivalent DFSA. Represent all of the states in CNF and simplify them. Don't forget to indicate final states.

2 Two way FSA

Question 7:

Given machine M, where 1 is initial state, and 3 is final state

M	a	b
1	2L	3R
2	4L	2R
3	2L	4R
4	4R	1L

- a) Construct the Rebound Table
- b) Convert machine M to 1 DFSA using the Rebound Table
- c) Simulate the 2 dfsa to see if ba or bb string got rejected or accepted

Question 8

Given machine M, where q_1 is the final state

M	0	1
q_0	q_0R	q_1R
q_1	q_1R	q_2L
q_2	q_0R	q_2L

- a) Construct the Rebound Table for machine M
- b) Simulate the 2dfs to show that 1001 is accepted by M

Question 9

Given the following 2-way deterministic fsa (2dfsa), where state 1 is the initial state, and states 2 and 3 are final states.

- (a) Simulate the 2dfsa and show how the string babb is accepted.
- (b) Construct the rebound tables and the equivalent 1dfsa partially only for consuming the string babb

M	a	b
1	2R	3R
2	4L	2R
3	4R	2L
4	1R	4L