

Konkuk university
Department of Software

Theory of Computation

Homework #1

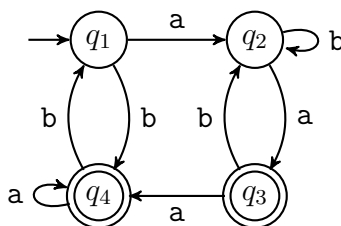
Due: Sep 22, 2017

You should turn in your homework **hand written** at the class.

1. The formal description of a DFA M is $(\{q_1, q_2, q_3, q_4, q_5\}, \{u, d\}, \delta, q_1, \{q_3\})$ where δ is given by the following table. Give the state diagram of this machine.

	u	d
q_1	q_1	q_2
q_2	q_1	q_3
q_3	q_2	q_4
q_4	q_3	q_5
q_5	q_4	q_5

2. The state diagram of a DFA M' is as follows. Give the formal description of this machine.



3. Give state diagrams of DFAs recognizing the following languages. In all parts, the alphabet is $\{0, 1\}$.

- a. $\{w \mid w \text{ begins with a } 1 \text{ and ends with a } 0\}$
- b. $\{w \mid w \text{ contains the substring } 0101 \text{ (i.e., } w = x0101y \text{ for some } x \text{ and } y)\}$
- c. $\{w \mid \text{if there exists an odd position in } w, \text{ then every odd position of } w \text{ is a } 1\}$
- d. $\{w \mid w \text{ includes at least one odd position, and every odd position of } w \text{ is a } 1\}$
- e. The empty set
- f. All strings except the empty string

4. Give the language recognized by the following state diagram.

