

## **Group Members**

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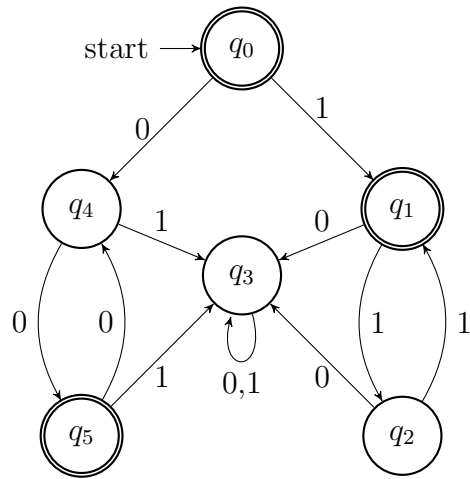
**Course Code:** COMP3602

**Course Title:** Theory of Computing

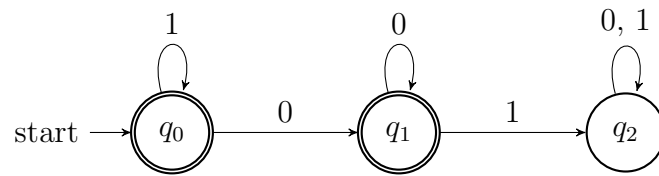
**Assignment:** 1

October 24, 2019

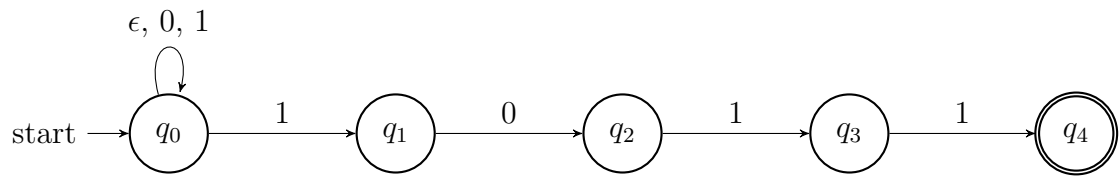
1. (a)  $\{0^n \vee 1^m \mid n \text{ is even, } m \text{ is odd}\}$



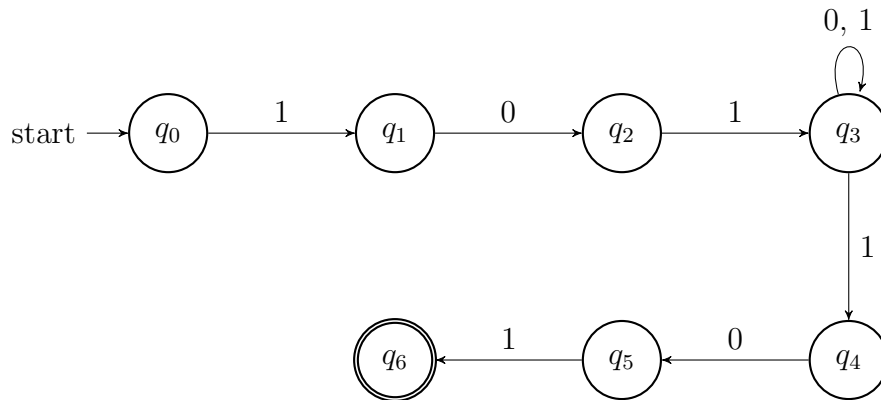
- (b) Any string that does not contain the substring 01



2. (a) Strings ending in 1011



(b)  $\{101x101 \mid x \in \Sigma^*\}$



3. Let us refer to the DFA in Question 1b as  $M$ . Then  $M = \{\{q_0, q_1, q_2\}, \{0, 1\}, \delta, q_0, \{q_0, q_1\}\}$  where  $\delta$  is given by:
- $$\begin{aligned}\delta(q_0, 0) &= q_1 \\ \delta(q_0, 1) &= q_0 \\ \delta(q_1, 0) &= q_1 \\ \delta(q_1, 1) &= q_2 \\ \delta(q_2, 0) &= q_2 \\ \delta(q_2, 1) &= q_2\end{aligned}$$
4. Let us refer to the NFA in Question 2b as  $N$ . Then  $N = \{\{q_0, q_1, q_2, q_3, q_4, q_5, q_6\}, \{0, 1\}, \delta, q_0, \{q_6\}\}$  where  $\delta$  is given by:
- $$\begin{aligned}\delta(q_0, 0) &= \{\} \\ \delta(q_0, 1) &= \{q_1\} \\ \delta(q_0, \epsilon) &= \{\} \\ \delta(q_1, 0) &= \{q_2\} \\ \delta(q_1, 1) &= \{\} \\ \delta(q_1, \epsilon) &= \{\} \\ \delta(q_2, 0) &= \{\} \\ \delta(q_2, 1) &= \{q_3\} \\ \delta(q_2, \epsilon) &= \{\} \\ \delta(q_3, 0) &= \{q_3\} \\ \delta(q_3, 1) &= \{q_3, q_4\} \\ \delta(q_3, \epsilon) &= \{\} \\ \delta(q_4, 0) &= \{q_5\} \\ \delta(q_4, 1) &= \{\} \\ \delta(q_4, \epsilon) &= \{\} \\ \delta(q_5, 0) &= \{\} \\ \delta(q_5, 1) &= \{q_6\} \\ \delta(q_5, \epsilon) &= \{\} \\ \delta(q_6, 0) &= \{\} \\ \delta(q_6, 1) &= \{\} \\ \delta(q_6, \epsilon) &= \{\}\end{aligned}$$

- 5.
- 6.
- 7.
- 8.
- 9.

Regular Expression	Recognized Strings	Non-Recognized Strings
$a^*b^*$		
$a(ba)^*bb$		
$a^+ \cup b^*$		
$(\epsilon \cup a)b$		