CS3133

HW#1

DUE: Monday, August 29

1. (1 point) Does $aba \in \{ba\}^*$?

2. (3 points) Let $L \subseteq \{0,1\}^*$ be the set of all binary strings which contain an even number of 0's and an odd number of 1's. That is, $111 \in L$, $0100000000100 \notin L$, $010001 \notin L$ and $1000101 \in L$. Show that L is regular.

3. (8 points) Let $L \subseteq \{0,1\}^*$ be the set of all binary strings which contain substring 10^i1 where i is a multiple of 4. That is, $111 \in L$, $0100000000100 \in L$, $010001 \notin L$ and $1000101 \notin L$. Show that L is regular.

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Solutions to HW#1

1. $aba \notin \{ba\}^* = \{\varepsilon, ba, baba, bababa, ...\}$

2. L is accepted by $M = (\{q_{ee}, q_{eo}, q_{oe}, q_{oo}\}, \{0,1\}, \delta, q_{ee}, \{q_{eo}\})$, where q_{xy}, $x, y \in \{e, o\}$, denotes a state such that the substring already read has an x parity of 0's and a y parity of 1's.

δ	0	1
q_{ee}	q_{oe}	q_{eo}
q_{eo}	q_{oo}	q_{ee}
q_{oe}	q_{ee}	q_{oo}
q_{oo}	q_{eo}	q_{oe}

3. L is accepted by $M = (\{q_0, q_1, q_2, q_3, q_4, q_5\}, \{0,1\}, \delta, q_0, \{q_5\})$.

δ	0	1
q_0	q_0	q_1
q_1	q_2	q_5
q_2	q_3	q_1
q_3	q_4	q_1
q_4	q_1	q_5
q_5	q_5	q_5