BRAC UNIVERSITY
Merul Badda, Dhaka, Bangladesh
CSE331 : Automata and Computability
Assignment 1
Summer 2024

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1. Construct DFA for the following regular languages:

$L_1(M) \to \{w \in \Sigma^* \mid w$ doesn't contain 00$\}$, where $\Sigma = \{0, 1\}$.

$L_2(M) \to \{w \in \Sigma^* \mid w$ doesn't contain 11$\}$, where $\Sigma = \{0, 1\}$.

A. $L(M) \to (\ L_1 \cap L_2\ )'$

B. $L(M) \to \{w \in \Sigma^* \mid$ the sum of the symbols of w is a multiple of 3$\}$, where $\Sigma = \{0, 1, 2\}$.

C. $L(M) \to \{w \in \Sigma^* \mid$ the decimal equivalent of w is a multiple of 5$\}$, where $\Sigma = \{0, 1\}$.

D. $L(M) \to \{w \in \Sigma^* \mid w$ is any string not in $0^*1^*\}$, where $\Sigma = \{0, 1\}$.

2. Write the RE for the following regular languages:

$L1(M) \to \{w \in \Sigma^* \mid$ every third position in w is 1$\}$, where $\Sigma = \{0, 1\}$.

$L2(M) \to \{w \in \Sigma^* \mid$ every 1 in w is followed by at least two 0$\}$, where $\Sigma = \{0, 1\}$.

A. $L(M) \to L1 \cap L2$

B. $L(M) \to \{w \in \Sigma^* \mid w$ starts and ends with the same symbol$\}$, where $\Sigma = \{0, 1\}$.

C. $L(M) \to \{w \in \Sigma^* \mid w$ contains equal numbers of 01 and 10$\}$, where $\Sigma = \{0, 1\}$.

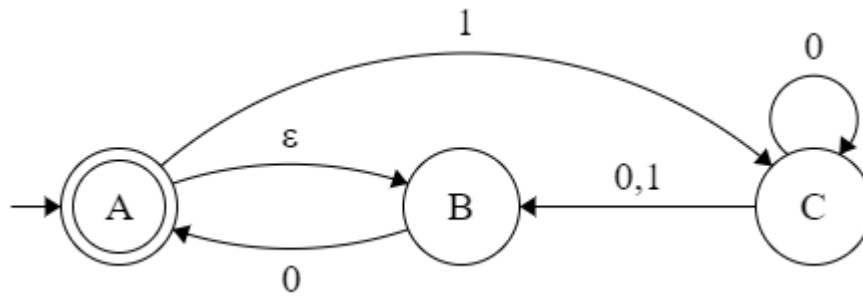D. $L(M) \to \{w \in \Sigma^* \mid w$ does not contain 101$\}$, where $\Sigma = \{0, 1\}$.

3. Construct NFA for the following regular languages:

A. $L(M) \to \{w \in \Sigma^* \mid w$ contains 1001 or 11$\}$, where $\Sigma = \{0, 1\}$. (use 5 states.)

B. $L(M) \to \{w \in \Sigma^* \mid w$ contains a 1 in the third position from the end$\}$, where $\Sigma = \{0, 1\}$.

C. $L(M) \to \{w \in \Sigma^* \mid$ length of w is a multiple of 2 or 3$\}$, where $\Sigma = \{0, 1\}$.

4. Convert the following NFA into DFA:
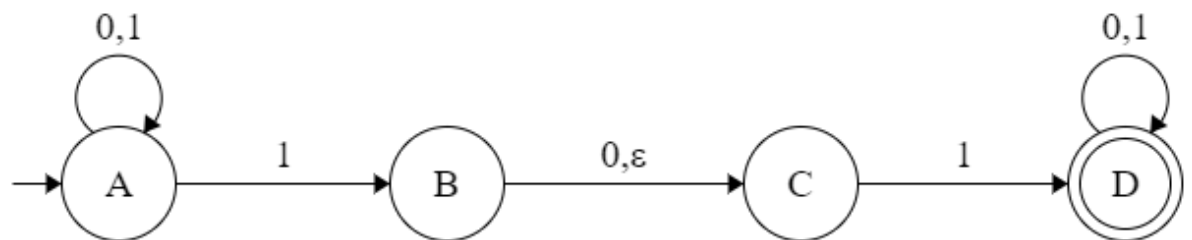
A.

B.

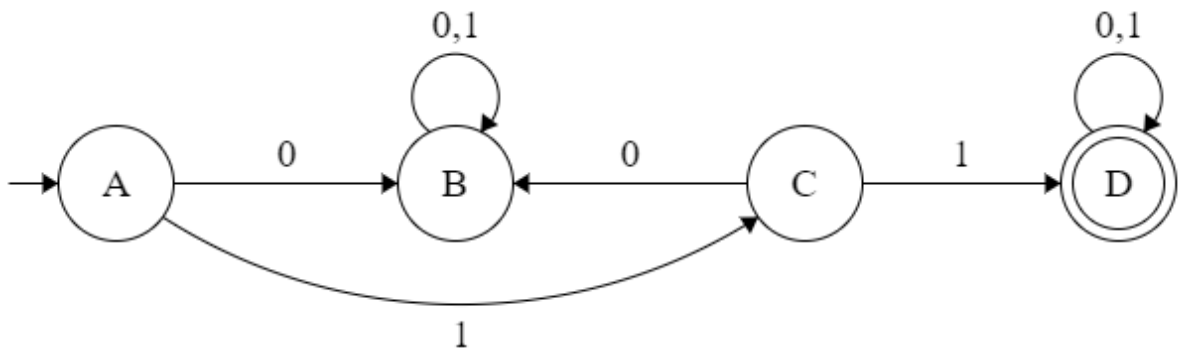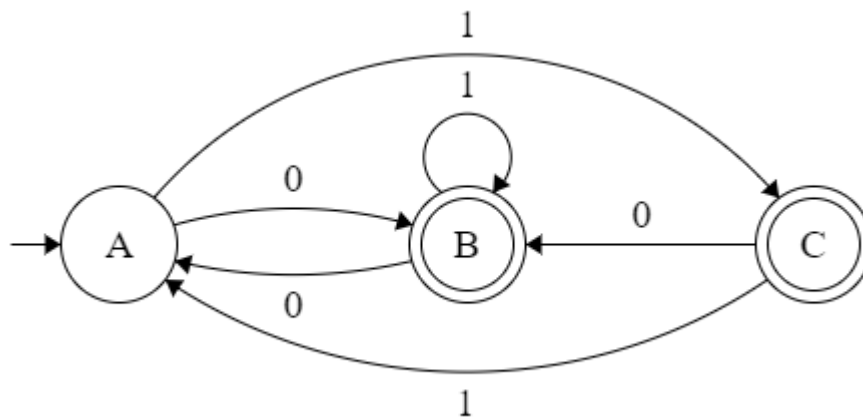## 5. Convert the following RE into NFA:

A. $(01 \mid 0)^*$

B. $(0 \mid 1)^* 010$

6. Convert the following DFA into RE:

A.

B.