

1. Find the minimum-state DFA that accepts the union of the languages represented by the following two regular expressions:

$$1^* \mid 10 \quad 10^*$$

2. Write a context-free grammar that generates the following context-free language

$$\{ a^n b^m c^n d^k \mid n \geq 0, m \geq 0, k \geq 0 \}$$

3. Build the LR(1) parsing table for the following grammar

$$S \rightarrow A B$$

$$A \rightarrow a A b \mid \varepsilon$$

$$B \rightarrow b B a \mid \varepsilon$$

Is the grammar LR(1)? Explain why.

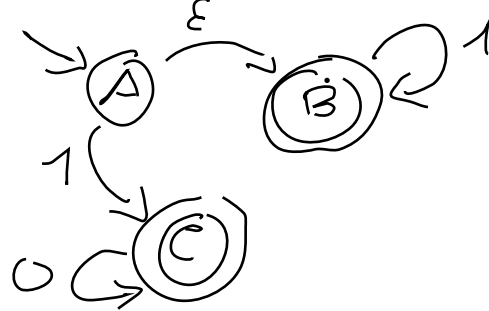
Is the grammar LR(0)? Explain why.

1. Find the minimum-state DFA that accepts the union of the languages represented by the following two regular expressions:

$1^* \mid 10$ 10^*

Regular expression of the union: $(1^* \mid 10) \mid 10^* = 1^* \mid 10^*$

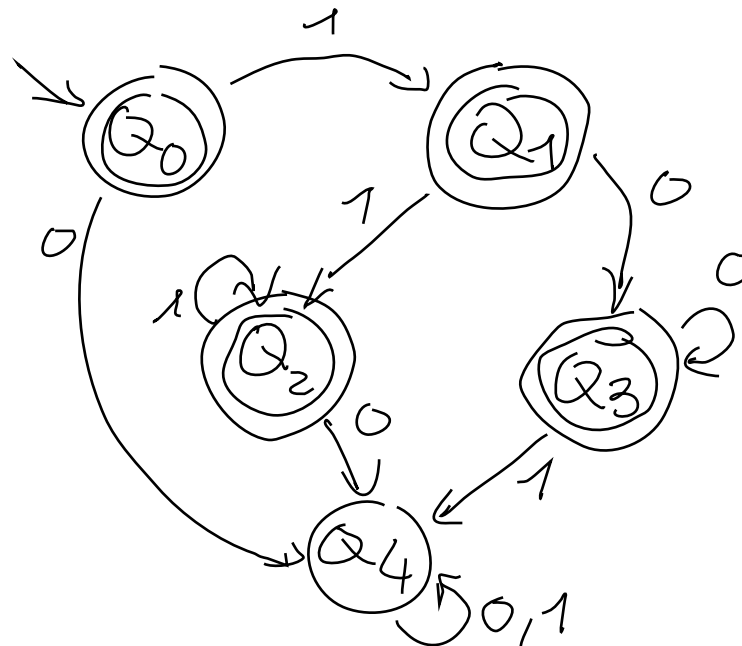
ϵ -NFA :



DFA : $\rightarrow Q_0$

		0	1
Q_0	*	$\{A, B\}$	$\{B, C\}$
Q_1	*	$\{B, C\}$	$\{B\}$
Q_2	*	$\{B\}$	$\{B\}$
Q_3	*	$\{C\}$	$\{C\}$
Q_4		$\{ \}$	$\{ \}$

DFA :



$\pi_0 : \{Q_0, Q_1, Q_2, Q_3\}, \{Q_4\}$

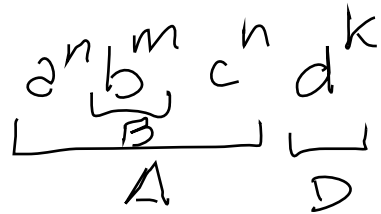
$\pi_1 : \{Q_0, Q_2\}, \{Q_1\}, \{Q_3\}, \{Q_4\}$

$\pi_2 : \{Q_0\}, \{Q_2\}, \{Q_1\}, \{Q_3\}, \{Q_4\}$

\Rightarrow The DFA is already minimum-state

2. Write a context-free grammar that generates the following context-free language

$$\{ a^n b^m c^n d^k \mid n \geq 0, m \geq 0, k \geq 0 \}$$



$$S \rightarrow AD$$

$$D \rightarrow dD \mid \epsilon$$

$$A \rightarrow aAc \mid B$$

$$B \rightarrow bB \mid \epsilon$$

3. Build the LR(1) parsing table for the following grammar

$$\begin{array}{ll} S \rightarrow AB & \phi \\ A \rightarrow aAb \mid \epsilon & 1, 2 \\ B \rightarrow bBa \mid \epsilon & 3, 4 \end{array}$$

Is the grammar LR(1)? Explain why.

Is the grammar LR(0)? Explain why.

