

主管
领导
审核
签字1. [10 points] Design a DFA for $L = \{w \in \{0, 1\}^* \mid w \text{ has exactly three 0s.}\}$ 2. [10 points] Design an NFA for the language:

$$L = \{w \in \{a, b, c\}^* \mid w \text{ starts with } ac \text{ and ends with } cb.\}$$

3. [10 points] Design regular expressions for languages over $\Sigma = \{a, b\}$.(1) All strings that do not end with aba .(2) $L = \{w \mid w \text{ has no more than 5 } a\text{'s.}\}$ 4. [10 points] Prove that the language $L = \{w \in \{a, b\}^* \mid w = w^R\}$ is not regular with pumping lemma.5. [10 points] Consider the following ε -NFA.

	ε	a	b	c
$\rightarrow p$	$\{q, r\}$	\emptyset	$\{q\}$	$\{r\}$
q	\emptyset	$\{p\}$	$\{r\}$	$\{p, q\}$
$*r$	\emptyset	\emptyset	\emptyset	\emptyset

(1) Compute the ε -closure of each state.

(2) Give all the strings of length three or less accepted by the automaton.

(3) Convert the automaton to a DFA by subset construction. (diagram of transition function)6. [10 points] Give a CFG for $L = \{a^i b^j c^k \mid i, j, k \geq 0 \text{ and } i = j + k\}$.7. [10 points] Find a grammar equivalent to

$$S \rightarrow AB \mid CA$$

$$A \rightarrow a$$

$$B \rightarrow BC \mid AB$$

$$C \rightarrow aB \mid b$$

with no useless symbols.8. [10 points] Design a PDA for $L_{eq} = \{w \in \{0, 1\}^* \mid w \text{ contains the same number of 0's and 1's}\}$.9. [10 points] Prove or disprove: if L_1 is CFL and $L_1 \cup L_2$ is also CFL, then L_2 must be CFL.10. [10 points] Design Turing machine for the language $\{0^{2n}1^n \mid n \geq 0\}$.

1. Design a DFA for the language $L = \{w \in \{0,1\}^* \mid w \text{ contains both } 01 \text{ and } 10 \text{ as substrings}\}$.

2. Design a NFA within four states for the language $\{a\}^* \cup \{ab\}^*$.

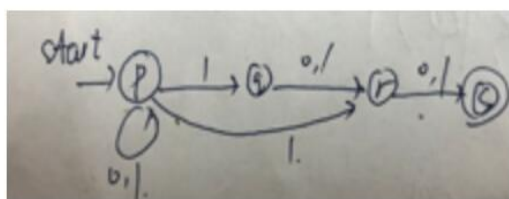
3. Design regular expressions for language over $\Sigma = \{0,1\}$.

(1). All strings contain the substring 001.

(2). All strings ~~except~~ the string 001. except

4. Prove that $L = \{0^m 1^n \mid m/n \text{ is an integer}\}$ is not regular with pumping lemma.

5. Convert the following NFA into DFA with subset construction.



6. Give a context-free grammar for $L = \{a^i b^j c^{i+j} \mid i, j \geq 0\}$

7. Let L be the language generated by the grammar G below

$S \rightarrow AB \mid BBB$

$A \rightarrow Bb \mid \epsilon$

$B \rightarrow aB \mid A$

(1). 消除空产生式

(2). 消除单元产生式

(3). 转换到 CNF

8. Design a PDA for $L = \{w \in \{a,b\}^* \mid w \text{ has more } a\text{'s than } b\text{'s}\}$

证明

9. Prove : for every context free language L, the language $L' = \{0^{|w|} \mid w \in L\}$ is also context free.

10. Design a Turing Machine that computes the following function $f: 0^n \rightarrow \text{Binary}(n)$

Where integer $n \geq 1$ and $\text{binary}(n)$ is the binary representation of n.

For example: $f(0^3) = 11$ $f(0^5) = 101$.

2019 年