计算理论 HW1

2024年9月23日星期一 下午9:45

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Q 1.7.4

(c) Assume that $A = \{a, b\}^*$ $B = a^*\{ba^*\}^*$

we only need to prove $A \subseteq B$ and $B \subseteq A$

- $B \subseteq A$: $\Sigma = \{a, b\}$ $\Sigma^* = \{a, b\}^* = A$ $B \subseteq \Sigma^*$

  so $B \subseteq A$

- $A \subseteq B$: $\forall\ a \in \{a, b\}^*$

  we can know that $a^*\{ba^*\}^* \Leftrightarrow a^*\{ba^*\}^*\{ba^*\}^*$

  $\Leftrightarrow a^* \cup a^* b^+ \{ba^*\}^* \Leftrightarrow a^* b^* b^* a^*$

  so $a \in B$. then $A \subseteq B$

(d) $A = \{L_1 \Sigma^* L_2\}^*$ $B = \Sigma^*$

- $A \subseteq B$:

  B contains all the strings. $A \subseteq B$

- $B \subseteq A$:

  $\forall s \in B$. $s \in \{\Sigma^*\}^* \subseteq \{e\Sigma^* e\}^* \subseteq \{L_1 \Sigma^* L_2\}^*$

  so $s \in A$. then $B \subseteq A$

Q 1.7.6

$L^+ + L^0 = L^*$ $L^0 = \{e\}$

so when $e \notin L$. $L^+ = L^* - \{e\}$

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Q 1.8.3

(c) L' is all the possible suffix of strings in L and regular expression is closed under right quotient so L' and L have the same regular expression

Q 1.8.5

(a) true $baa \in b^*a^* \subseteq a^*b^*a^*b^*$

(b) true $b^*a^* \cap a^*b^*$ means the intersaction between the string any a then any b and any b then any a the string with a and b is not in $b^*a^* \cap a^*b^*$.

(c) false $a^*b^* \cap b^*c^* = b^*$

the string with a and b is not in $b^*a^* \cap a^*b^*$.

(c) false $a^*b^* \cap b^*c^* = b^*$

(d) false the string in $(a(cd)^*b)^*$ must have a between b and c