

第 3 次作业 正则语言的性质

5.1

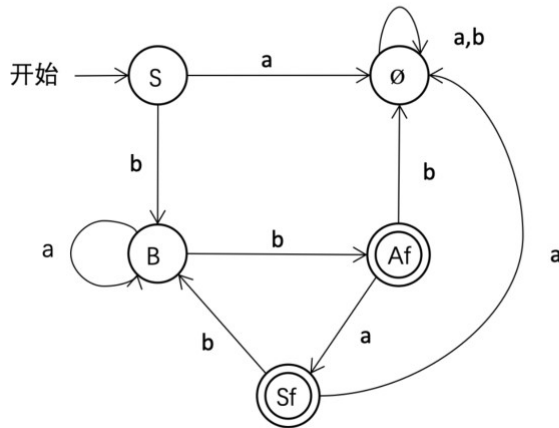
1) $G_1=(V,T,P_1,S)$

$P_1=S \rightarrow bB, B \rightarrow aB \mid bA \mid b, A \rightarrow a \mid aS$

解：构造对应的有穷自动机 $M = (\{S, A, B, f\}, \{a, b\}, \delta, S, \{f\})$ ，其中：

$\delta(S, b) = \{B\}, \delta(B, a) = \{B\}, \delta(B, b) = \{A\}, \delta(A, a) = \{f\}, \delta(A, b) = \{S\}$

对应 DFA 如下图：



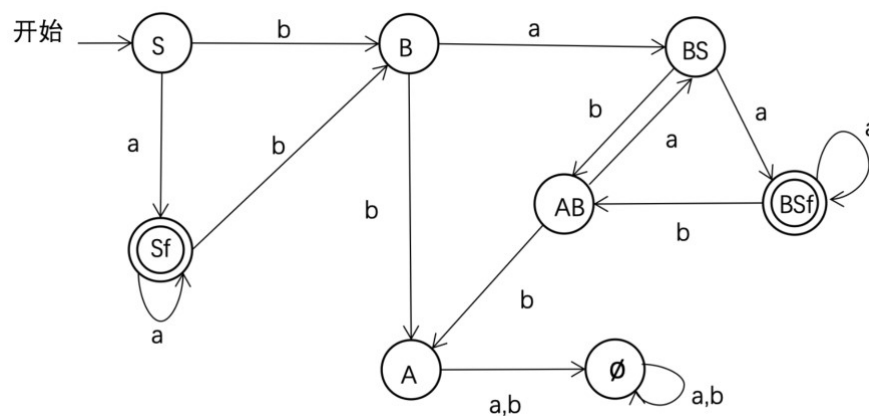
2) $G_2=(V,T,P_2,S)$

$P_2=S \rightarrow aS \mid bB \mid a, B \rightarrow bA \mid aB \mid aS$

解：构造对应的有穷自动机 $M = (\{S, A, B, f\}, \{a, b\}, \delta', S, \{f\})$ ，其中：

$\delta'(S, a) = \{S\}, \delta'(S, b) = \{B\}, \delta'(S, a) = \{f\}, \delta'(B, b) = \{A\}, \delta'(B, a) = \{B\}, \delta'(B, a) = \{f\}$

对应 DFA 如下图：



5.2

a)

解：由 DFA M_1 :

$A \rightarrow 0 \mid 0A \mid 1 \mid 1B$

$B \rightarrow 1 \mid 1B \mid 0C$

$C \rightarrow 0C \mid 1C$

或者:

$A \rightarrow \varepsilon \mid 0A \mid 1B$

$B \rightarrow \varepsilon \mid 1B \mid 0C$

$C \rightarrow 0C \mid 1C$

b)

解：由 DFA M_2 :

$A \rightarrow 0 \mid 0B \mid 1 \mid 1D$

$B \rightarrow 0 \mid 0A \mid 1 \mid 1D$

$C \rightarrow 1 \mid 1B \mid 0 \mid 0D$

$D \rightarrow 1 \mid 1B \mid 0C$

或者:

$A \rightarrow \varepsilon \mid 0B \mid 1D$

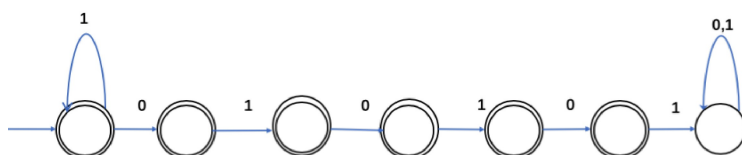
$B \rightarrow \varepsilon \mid 0A \mid 1D$

$C \rightarrow 1B \mid 0D$

$D \rightarrow \varepsilon \mid 0C \mid 1B$

5.3 (3)

解：该语言是正则语言，因为下列 NFA 可以识别该语言。



5.3 (6)

解：是正则语言。

可以构造出对应的有穷自动机 $M = (\{S, A, B, C, D, f\}, \{0, 1\}, \delta, S, \{f\})$,

其中:

$\delta(S, 0) = \{A\}$

$\delta(A, 0) = \{C\}$

$\delta(B, 0) = \{D\}$

$\delta(C, 1) = \{C\}$

$\delta(D, 0) = \{D\}$

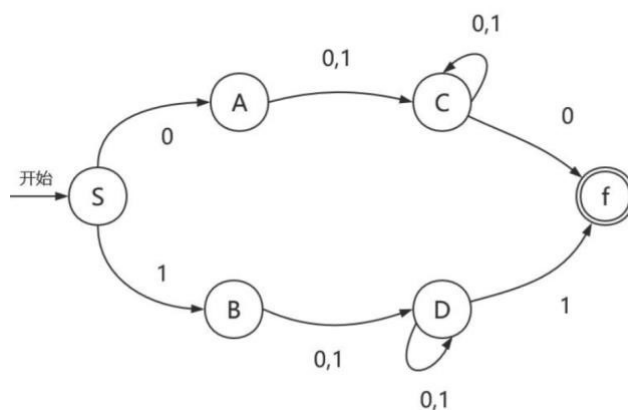
$\delta(S, 1) = \{B\}$

$\delta(A, 1) = \{C\}$

$\delta(B, 1) = \{D\}$

$\delta(C, 0) = \{C, f\}$

$\delta(D, 1) = \{D, f\}$



由于正则语言与有穷自动机的等价性，可知其是正则语言。