

Homework 4 汪辉 3190105609

4.1.2

(a) $(q_0, \Delta a \underline{b} b \sqcup b b \sqcup \sqcup \sqcup a b a) \vdash M(q_0, \Delta a b b \sqcup b b \sqcup \sqcup \underline{a} b a)$
 $\vdash M(q_1, \Delta a b b \sqcup b b \sqcup \sqcup \underline{a} b a)$
 $\vdash M(q_1, \Delta a b b \sqcup b \underline{b} \sqcup \sqcup a b a)$
 $\vdash M(q_2, \Delta a b b \sqcup b b \sqcup \sqcup \underline{a} b a)$
 $\vdash M(h, \Delta a b b \sqcup b b \sqcup \sqcup \underline{a} b a)$

(b) 1. 向右读到第一个 a.
 2. 反向向左读到第一个 b
 3. 再反向向右读到第一个 \sqcup 后停机

4.1.7

$K = \{q_0, q_1, h\}$, $\Sigma = \{a, b, \sqcup, \triangleright\}$, $S = \{q_0\}$, $H = \{h\}$.

$\delta =$

q	σ	$\delta(q, \sigma)$
q_0	a	(q_1, \rightarrow)
q_0	b	(q_0, \rightarrow)
q_0	\sqcup	(q_0, \rightarrow)
q_0	\triangleright	(q_0, \rightarrow)
q_1	a	(h, a)
q_1	b	(q_0, \rightarrow)
q_1	\sqcup	(q_0, \rightarrow)
q_1	\triangleright	(q_0, \rightarrow)

1.1-10

向右读时将读到的第一个 \sqcup 替换成读到的第一个非 \sqcup 字符，将读到的第二个 \sqcup 替换成读到的第二个非 \sqcup 字符。

1.2.2

$$a) R \xrightarrow{a, b, \sqcup} n$$

$$b) R \xrightarrow{\sqcup} y$$

$$\sqcup \sqcup n$$

$$c) a \rightarrow R \xrightarrow{b} n$$

$$\sqcup \sqcup y$$

1.2.4

$$a) a \rightarrow R a \xrightarrow{b} n$$

$$b) a \rightarrow R a \xrightarrow{b} y$$

$$\sqcup \sqcup n$$

c) 不能 任何输入, TM 非判定的语言即令 TM 停机的输入集

$$1.2 \text{ (a)} V = \{a, b, s, \top, \cup, A, B, \bar{I}, \bar{I}, x, \emptyset\}, \Sigma = \{a, b\}$$

$$R = \{s \rightarrow \bar{I} \bar{I} \bar{I}, \top \rightarrow x \bar{I} x, \emptyset \top \rightarrow \emptyset \cup, \cup x \rightarrow A a \cup, \cup x \rightarrow B b \cup, x A \rightarrow A x, x B \rightarrow B x, \bar{I} A \rightarrow a \bar{I}, \bar{I} B \rightarrow b \bar{I}, \bar{I} \emptyset \rightarrow e, \cup \bar{I} \rightarrow e\}.$$

$$7.2(a) \text{ factorial}(0) = 1$$

$$\text{factorial}(n+1) = (n+1) \cdot \text{factorial}(n)$$

$$b) \text{ gcd}(m, n) = \begin{cases} n, & n \% m = 0 \\ \text{gcd}(n, n \% m), & \text{if } n \% m \neq 0. \end{cases}$$