



中国科学院大学

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3.1 (d) $q_1 000000 \vdash \cup q_2 00000 \vdash \cup x q_3 0000 \vdash \cup x 0 q_4 000 \vdash \cup x 0 x q_5 00$
 $\vdash \cup x 0 x 0 q_4 0 \vdash \cup x 0 x 0 x q_3 \vdash \cup x 0 x 0 q_5 x \vdash \cup x 0 x q_5 0 x \vdash \cup x 0 q_5 x 0 x$
 $\vdash \cup x q_5 0 x 0 x \vdash \cup q_5 x 0 x 0 x \vdash q_5 \cup x 0 x 0 x \vdash \cup q_2 x 0 x 0 x \vdash \cup x q_2 0 x 0 x$
 $\vdash \cup x x q_2 x 0 x \vdash \cup x x x q_2 0 x \vdash \cup x x x 0 q_4 x \vdash \cup x x x 0 x q_4 \vdash \cup x x x 0 x \text{ reject}$

3.2 (d) $q_1 10 \# 11 \vdash x q_3 0 \# 11 \vdash x 0 q_3 \# 11 \vdash x 0 \# q_4 11 \vdash x 0 q_6 \# x 1$
 $\vdash x q_6 \# x 1 \vdash q_7 x 0 \# x 1 \vdash x q_7 0 \# x 1 \vdash x x q_2 \# x 1 \vdash x x \# q_4 x 1$
 $\vdash x x \# x q_4 1 \vdash x x \# x 1 \text{ reject}$

3. $\Sigma = \{a, b\}$, 设计一台 Turing Machine 识别语言 $\{w \mid w \in \Sigma^*, \text{且 } w \text{ 中 } a \text{ 与 } b \text{ 个数相同}\}$

设计的 Turing Machine $(Q, \Sigma, \Gamma, \delta, q_0, q_{\text{accept}}, q_{\text{reject}})$ 如下:

$Q = \{q_0, q_1, q_2, q_3, q_4, q_{\text{accept}}, q_{\text{reject}}\}$

$\Sigma = \{a, b\}$

$\Gamma = \{a, b, \cup, x\}$

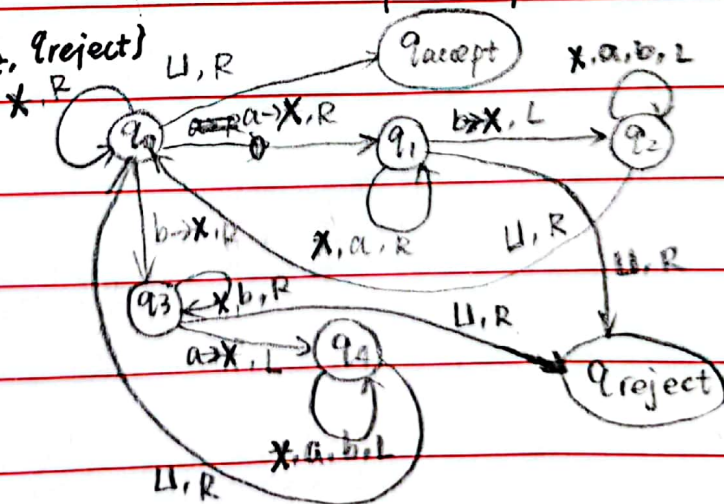
δ 见状态转移图

$q_0 \in Q$ 为起始状态

$q_{\text{accept}} \in Q$ 为接受状态

$q_{\text{reject}} \in Q$ 为拒绝状态

用 TM-simulator 验证通过.



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 aa
 aba
 $abab$
 $aaabbb$
 $abba$
 \cup
 abb
 $baba$
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 \cup
 b
 abb

