4.1.2

(a) $(q_0, \triangleright a\underline{b}b\sqcup bb\sqcup\sqcup\sqcup aba) \vdash_M (q_0, \triangleright ab\underline{b}\sqcup bb\sqcup\sqcup\sqcup aba)$

$\vdash_M (q_0, \triangleright abb\underline{\sqcup}bb\sqcup\sqcup\sqcup aba)$

$\vdash_M (q_0, \triangleright abb\sqcup bb\sqcup\sqcup\sqcup \underline{a}ba)$

$\vdash_M (q_1, \triangleright abb\sqcup bb\sqcup\sqcup\underline{\sqcup} aba)$

$\vdash_M (q_1, \triangleright abb\sqcup b\underline{b}\sqcup\sqcup\sqcup aba)$

$\vdash_M (q_2, \triangleright abb\sqcup bb\underline{\sqcup}\sqcup\sqcup aba)$

$\vdash_M (h, \triangleright abb\sqcup bb\underline{\sqcup}\sqcup\sqcup aba)$

(b) M向右扫描直到找到一个a，往左直到找到一个b，再向右找一个a⊔，停

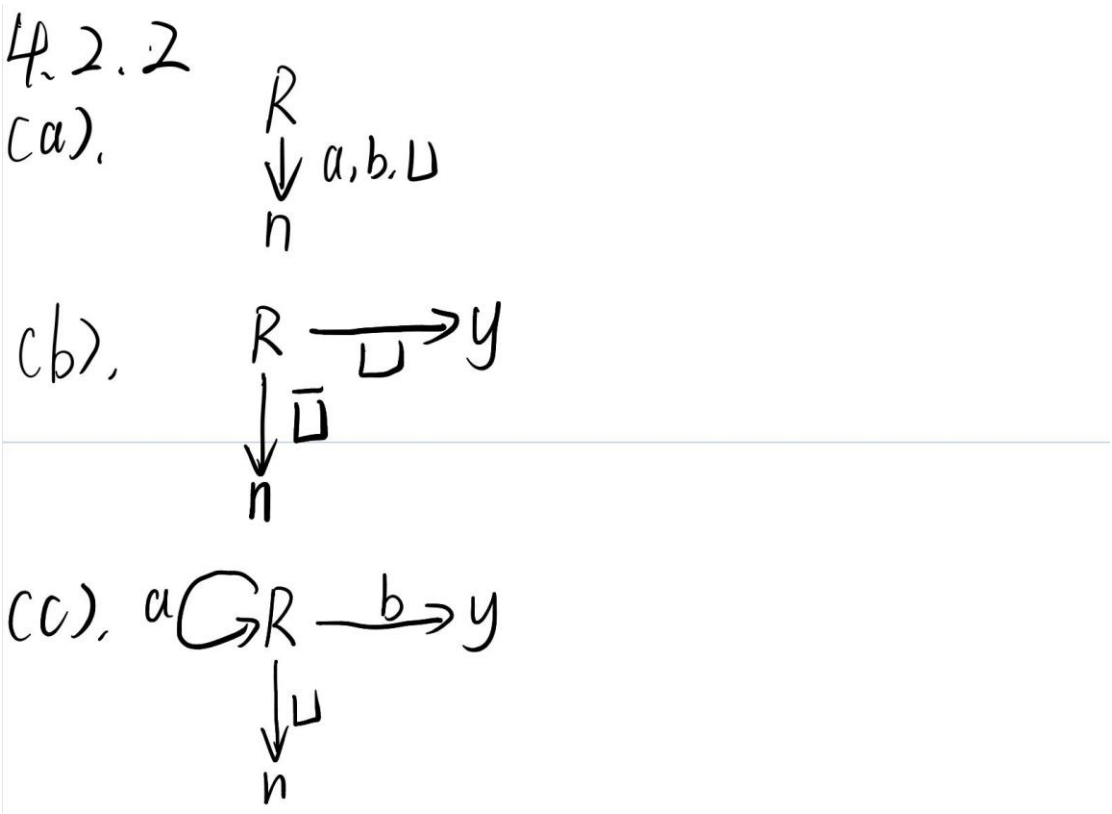
4.1.7

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

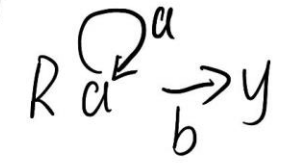
q	σ	$\delta(q, \sigma)$
q_0	a	$(q_1, \rightarrow)$
q_0	b	$(q_0, \rightarrow)$
q_0	⊔	$(q_0, \rightarrow)$
q_0	▷	$(q_0, \rightarrow)$
q_1	a	(h, a)
q_1	b	$(q_0, \rightarrow)$
q_1	⊔	$(q_0, \rightarrow)$
q_1	▷	$(q_0, \rightarrow)$

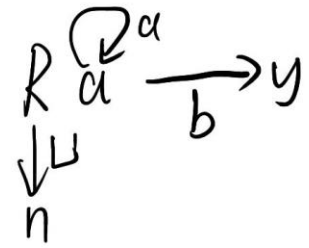
4.1.10

这个机器向右扫描，记住第一个和第二个非空的字母，然后继续向右，先写下 a 再写下 b（如果有）



4.2.4

(a). 

(b). 

(c). no

4.6.2

(a) $\Sigma = \{a, b\}$. $V = \{a, b, A, B, C, D, E, [,], \$, x\}$

$R = \{ C \to [D]. \; D \to xDx. \; D \to \$E. \;$

$Ex \to BaE, \; Ex \to AaE, \; xA \to Ax, \; xB \to Bx,$

$[A \to a[. \; [B \to b[. \; [\$ \to e. \;]] \to e \}$

4.7.2

(a) 当 $n \geq 0$, $f(n) = 1$

当 $n > 0$, $f(n) = n \cdot f(n-1)$

(b) 设 $m > n$

$$gcd(m, n) = \begin{cases} n, & rem(m, n) = 0 \\ gcd(rem(m, n), n), \end{cases}$$