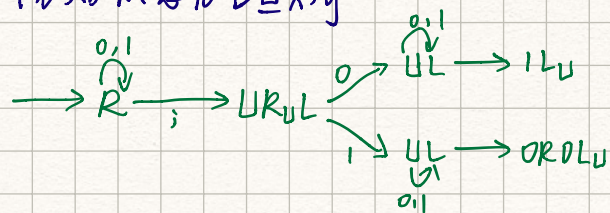


04~05

设计计算如下函数的图灵机

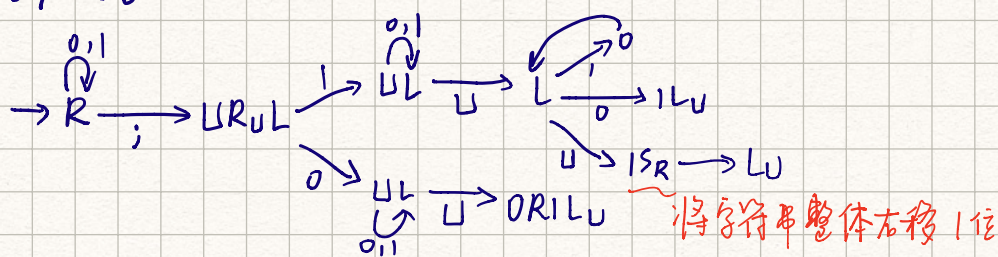
$$f(x,y) = \begin{cases} 2x+1, & \text{if } y \text{ is even} \\ 4x, & \text{if } y \text{ is odd} \end{cases}$$

初始状态为 $\Delta \sqcup x; y$



向右找到分号, 将其设为空格, 继续向右直至结束, 再向左, 得到 y 的最后 1 位, 为 0 为 even, 为 1 为 odd, 再向左找到空格, 为 0 则加 $2x$, 为 1 则加 $1x$.

07~08



(a) 描述其对 $\Delta \sqcup 10111; 10$ 的运行关键操作

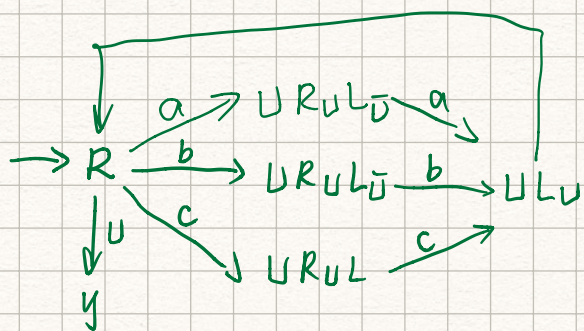
(b) 给出对应函数 $f(x,y)$.

$$(a) \Delta \sqcup 10111; 10 \vdash_m^* \Delta \sqcup 10111; 10 \vdash_m^* \Delta \sqcup 10111 \sqcup 10 \vdash_m^* \Delta \sqcup 10111 \sqcup \sqcup \vdash_m^* \Delta \sqcup 1011101$$

$$(b) f(x,y) = \begin{cases} x+1, & y \text{ is odd} \\ 4x+1, & y \text{ is even} \end{cases} \quad \text{我好傻啊!}$$

08~09

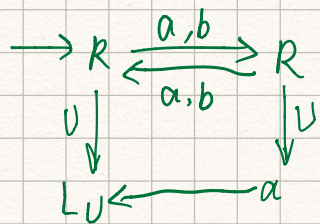
设计判定 $L = \{ww^R \mid w \in \{a,b,c\}^*\}$ 的图灵机.



09-10

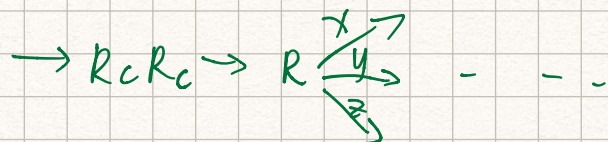
构造图灵机计算函数 $f: \{a, b\}^* \rightarrow \{a, b\}^*$

$$f(w) = \begin{cases} w, & |w| \text{ is even} \\ wa, & |w| \text{ is odd} \end{cases}$$



10~11

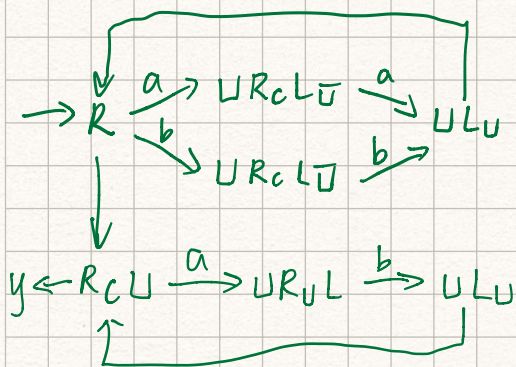
$$L = \{xyczz^R \mid x, y, z \in \{a, b\}^*\}$$



11~12

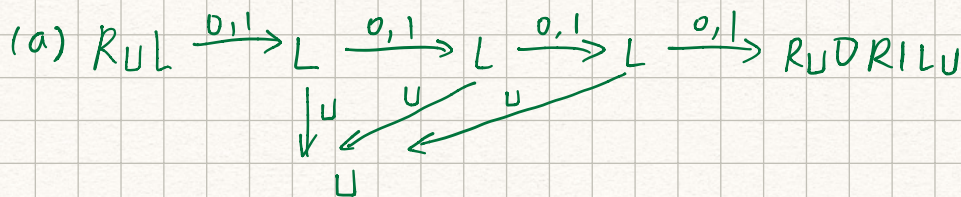
$$L = \{(xx^R)^R c a^n b^n \mid x \in \{a, b\}^*, n \in \mathbb{N}\}$$

$$(xx^R)^R = xx^R$$



12~13

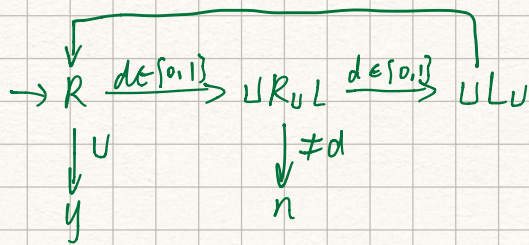
$$\psi(x) = \begin{cases} x, & x < 8 \\ 4x+1, & x \geq 8 \end{cases}$$



$$(b) \varphi(x) = (x < 8) \cdot x + (1 \sim (x < 8)) \cdot (4x+1)$$

13 ~ 14

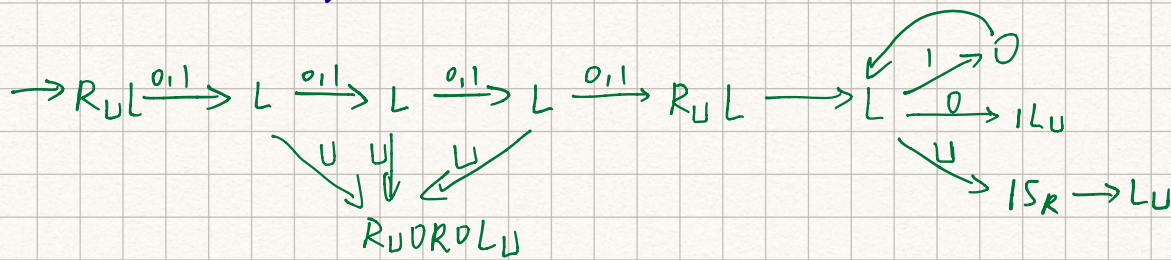
$$L = \{ww^R \mid w \in \{0,1\}^*\}$$



14 ~ 15

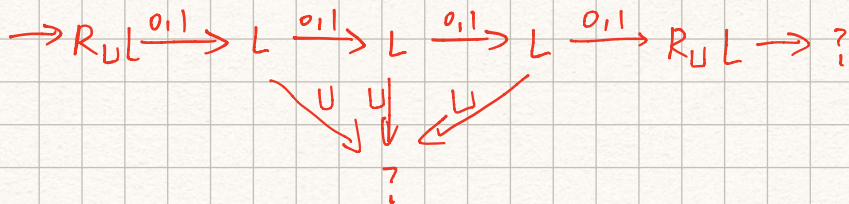
U | 1 | 0

$$\varphi(x) = \begin{cases} 4x, & x < 8 \\ x+2, & x \geq 8 \end{cases}$$

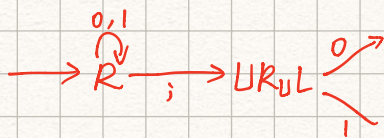


注意: 别忘了计算型图灵机最后应回到 L_U

① $x \geq 8; x < 8$ 型: 先到最右端, 再向左发现开头空格后有不少于 4 个数即 $x \geq 8$, 反之 $x < 8$



② y 为奇; y 为偶型: 对 $\triangleright x; y$



③ ww^R 型

