

# 编译原理 hw3

3.27

$S \rightarrow I/R \quad I \rightarrow d/Id \quad R \rightarrow WpF$

$W \rightarrow Wd/\varepsilon \quad F \rightarrow Fd/d$

a)  $S$  数字  $I$  整数  $R$  浮点数  
 $W$  浮点数的整数部分  $F$  浮点数小数部分

b) 不是 LR(1)

①  $S' \rightarrow S$

~~$FIRST(S) = FIRST(I) = FIRST(R) =$~~

②  $S \rightarrow I$

~~$FIRST(W)$~~

③  $S \rightarrow R$

$FIRST(S) = \{d, p\}$

④  $I \rightarrow d$

$FIRST(I) = \{d\}$

⑤  $I \rightarrow Id$

$FIRST(R) = \{d, p\}$

⑥  $R \rightarrow WpF$

$FIRST(W) = \{d, \varepsilon\}$

⑦  $W \rightarrow Wd$

$FIRST(F) = \{d\}$

⑧  $W \rightarrow \varepsilon$

$FOLLOW(S) = \{\$ \}$

⑨  $F \rightarrow Fd$

$FOLLOW(I) = \{\$, d\}$

⑩  $F \rightarrow d$

$FOLLOW(R) = \{\$ \}$

$FOLLOW(W) = \{d, p\}$

$FOLLOW(F) = \{d, \$ \}$



$I_0: S' \rightarrow \cdot S, \$$

$S \rightarrow \cdot I, \$$

$S \rightarrow \cdot R, \$$

$I \rightarrow \cdot d, \$/d$

$I \rightarrow \cdot Id, \$/d$

$R \rightarrow \cdot wpF, \$$

$W \rightarrow \cdot wd, d/p$

$W \rightarrow \cdot, d/p$

$I_6: I \rightarrow Id \cdot, \$/d$

$I_7: R \rightarrow wp \cdot F, \$$

$F \rightarrow \cdot Fd, \$/d$

$F \rightarrow \cdot d, \$/d$

$I_8: W \rightarrow wd \cdot, d/p$

$I_9: R \rightarrow wpF \cdot, \$$

$F \rightarrow F \cdot d, \$/d$

$I_1: S' \rightarrow S \cdot, \$$

$I_2: S \rightarrow I \cdot, \$$

$I \rightarrow I \cdot d, \$/d$

$I_3: S \rightarrow R \cdot, \$$

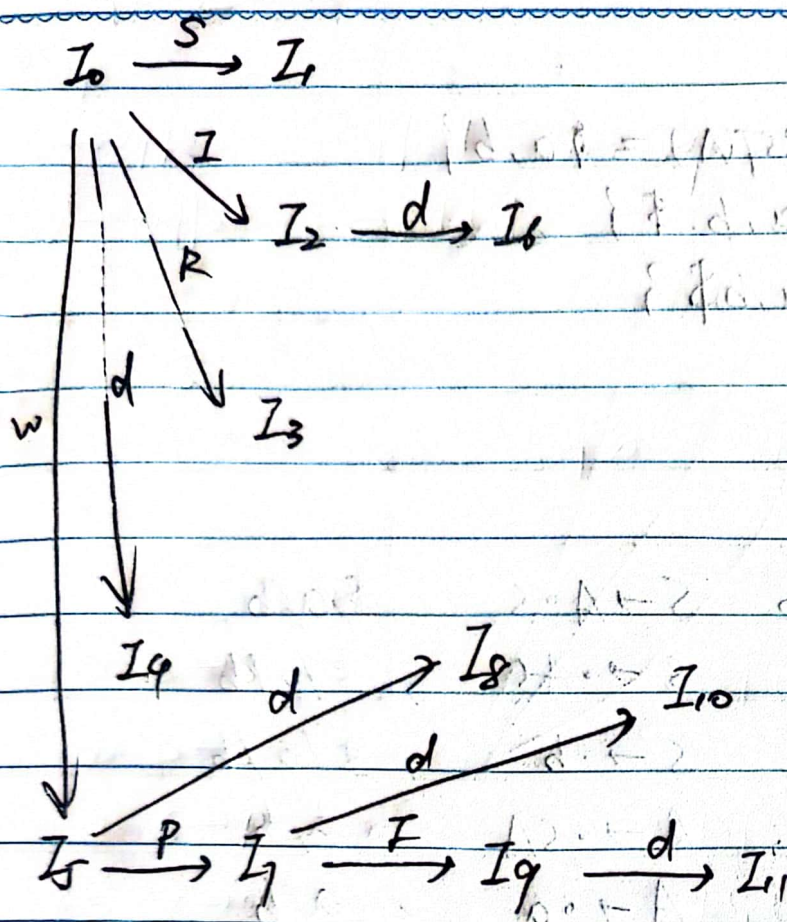
$I_4: I \rightarrow d \cdot, \$/d$

$I_5: R \rightarrow wpF, \$$

$W \rightarrow w \cdot d, d/p$







	d	P	F	S	I	R	w	F
0	se, 17	17		1	2	3	5	
1			ace					
2	56		21					
3			22					
4	23		23					
5	58	57						
6	24		24					
7	510							
8	26	16						
9	511		25					
10	19		19					
11	12		28					

9

有冲突。

3.3]

$$\textcircled{1} \quad S' \rightarrow S \quad \text{FIRST}(S) = \text{FIRST}(A) = \{a, b\}$$

$$\textcircled{1} \quad S \rightarrow AS \quad \text{FOLLOW}(S) = \{a, b, \$\}$$

$$\textcircled{2} \quad S \rightarrow b \quad \text{FOLLOW}(S) = \{a, b, \$\}$$

$$\textcircled{3} \quad A \rightarrow SA$$

$$\textcircled{4} \quad A \rightarrow a$$

$$I_0 \quad S' \rightarrow \cdot S, \$$$

$$S \rightarrow \cdot AS, \$/a/b$$

$$S \rightarrow \cdot b, \$/a/b$$

$$A \rightarrow \cdot SA, a/b$$

$$A \rightarrow \cdot a, a/b$$

$$I_1 \quad S \rightarrow A \cdot S, \$/a/b$$

$$S \rightarrow \cdot AS, \$/a/b$$

$$S \rightarrow \cdot b, \$/a/b$$

$$A \rightarrow \cdot SA, a/b$$

$$A \rightarrow \cdot a, a/b$$

$$I_2 \quad S' \rightarrow S \cdot, \$$$

$$A \rightarrow S \cdot A, a/b$$

$$A \rightarrow \cdot SA, a/b$$

$$A \rightarrow \cdot a, a/b$$

$$S \rightarrow \cdot AS, a/b$$

$$S \rightarrow \cdot b, a/b$$

$I_3$

$$S \rightarrow b \cdot, \$/a/b$$

$I_4$

$$A \rightarrow a \cdot, a/b$$





$I_5$

$A \rightarrow SA \cdot, a/b$

$S \rightarrow \cancel{A} \cdot S, a/b$

$S \rightarrow \cdot AS, a/b$

$S \rightarrow \cdot b, a/b$

$A \rightarrow \cdot SA, a/b$

$A \rightarrow \cdot a, a/b$

~~$I_8$~~

$S \rightarrow AS \cdot, a/b$

$A \rightarrow S \cdot A, a/b$

$A \rightarrow SA \cdot, a/b$

$A \rightarrow \cdot a, a/b$

$S \rightarrow \cdot AS, a/b$

$S \rightarrow \cdot b, a/b$

$I_6$

$A \rightarrow S \cdot A, a/b$

$A \rightarrow \cdot SA, a/b$

$S \rightarrow \cdot AS, a/b$

$S \rightarrow \cdot b, a/b$

$A \rightarrow \cdot a, a/b$

$I_9$

$S \rightarrow A \cdot S, a/b$

$S \rightarrow \cdot AS, a/b$

$S \rightarrow \cdot b, a/b$

$A \rightarrow \cdot SA, a/b$

$A \rightarrow \cdot a, a/b$

$I_7$

$S \rightarrow AS \cdot, \$/a/b$

~~$S \rightarrow$~~   $A \rightarrow S \cdot A, a/b$

$A \rightarrow \cdot SA, a/b$

$A \rightarrow \cdot a, a/b$

$S \rightarrow \cdot AS, a/b$

$S \rightarrow \cdot b, a/b$

$I_{10}$

$S \rightarrow b \cdot, a/b$







abab

~~(1)  $S_0 \rightarrow r_0 \rightarrow S_3 \rightarrow r_2$~~

(1)  $S_0 \rightarrow r_0 \rightarrow S_3 \rightarrow r_2 \rightarrow S_4 \rightarrow r_4 \rightarrow r_3 \rightarrow S_3 \rightarrow r_2 \rightarrow r_1 \rightarrow r_1$  acc

(2)  $S_0 \rightarrow r_0 \rightarrow S_3 \rightarrow r_2 \rightarrow r_1 \rightarrow S_0 \rightarrow r_0 \rightarrow r_3 \rightarrow S_3 \rightarrow r_2 \rightarrow r_1 \rightarrow r_1$  acc

(3)  $S_0 \rightarrow r_0 \rightarrow S_3 \rightarrow r_2 \rightarrow r_1 \rightarrow S_0 \rightarrow r_0 \rightarrow S_{10} \rightarrow r_2$  (S)

(4)  $S_0 \rightarrow r_0 \rightarrow S_3 \rightarrow r_2 \rightarrow S_0 \rightarrow r_0 \rightarrow S_{10}$  (S)



3  $S \rightarrow (L) | a$      $L \rightarrow L, S | S$

$S' \rightarrow S$      $\text{print}(S.\text{val})$

$S \rightarrow (L)$      $S.\text{val} = L.\text{val} + 1$

$S \rightarrow a$      $S.\text{val} = 0$

$L \rightarrow L, S$      $L.\text{val} = L_1.\text{val} + S.\text{val}$

$L \rightarrow S$      $L.\text{val} = S.\text{val}$

1  $S' \rightarrow S$      $\text{print}(S.\text{val})$

$S \rightarrow (L)$      $S.\text{val} = L.\text{val} + 1$

$S \rightarrow a$      $S.\text{val} = 0$

$L \rightarrow L, S$      $L.\text{val} = L_1.\text{val} > S.\text{val} ? L_1.\text{val} : S.\text{val}$

$L \rightarrow S$      $L.\text{val} = S.\text{val}$

5  $S \rightarrow E$      $E \rightarrow \text{while } E_1 \text{ do } E_2 \mid \text{id} \mid := E \mid E + E \mid \text{id} \mid (E)$

$S' \rightarrow S$      $\text{print}(S.\text{val})$

$S \rightarrow E$      $S.\text{val} = E.\text{val}$

$E \rightarrow \text{while } E_1 \text{ do } E_2$      $E.\text{val} = E_1.\text{val} > E_2.\text{val} ? E_1.\text{val} + 1 : E_2.\text{val} + 1$

$E \rightarrow \text{id} := E_1$      $E.\text{val} = E_1.\text{val}$

$E \rightarrow E_1 + E_2$      $E.\text{val} = E_1.\text{val} > E_2.\text{val} ? E_1.\text{val} : E_2.\text{val}$

$E \rightarrow \text{id}$      $E.\text{val} = 0$

$E \rightarrow (E_1)$      $E.\text{val} = E_1.\text{val}$





4.9

$S' \rightarrow S$	$\text{print}(S.\text{val})$
$S \rightarrow L_1 \cdot L_2$	$S.\text{val} = L_1.\text{val} + \frac{L_2.\text{val}}{\sum \log_2 L_2.\text{val}}$
$S \rightarrow L_1$	$S.\text{val} = L_1.\text{val}$
$L \rightarrow L_1 B$	$L.\text{val} = 2L_1.\text{val} + B.\text{val}$
$L \rightarrow B$	$L.\text{val} = B.\text{val}$
$B \rightarrow 0$	$B.\text{val} = 0$
$B \rightarrow 1$	$B.\text{val} = 1$

2) 将  $L_2$  改为  $R$   ~~$L \rightarrow L_1 B$  中  $L_1$  改为  $R$~~

~~$S \rightarrow S$~~   $C$  和  $\text{val}$  综合属性  $i$  是  $B$  的继承属性  
 ~~$S \rightarrow L \cdot R$~~   $\text{depth}$  和  $\text{float}$  是  $L$  的继承属性  
 ~~$S \rightarrow E$~~

~~$L \rightarrow RB$~~

~~$B \rightarrow B$~~

$S' \rightarrow S$

$\text{print}(S.\text{val})$

$S \rightarrow L_1 \cdot L_2$

$S.\text{val} = L_1.\text{val} + \frac{L_2.\text{val}}{\sum \log_2 L_2.\text{val}}$   $L_1.\text{depth} = 0$

$S \rightarrow L$

$S.\text{val} = L.\text{val}$   $L.\text{depth} = 1$   $L.\text{float} = 0$   $L_1.\text{float} = 0$

$L \rightarrow L_1 B$

$L.\text{val} = 2L_1.\text{val} + B.\text{val}$   $L_1.\text{depth} = L_1.\text{depth} + 1$   $L_2.\text{depth} = 1$

$L \rightarrow B$

$L.\text{val} = B.\text{val}$

$B.\text{c} = 2^{L_1.\text{float} + L_2.\text{depth}}$   $L_2.\text{float} = 1$

$B \rightarrow 0$

$B.\text{val} = 0$   $B.\text{c} = 0$

$B \rightarrow 1$

$B.\text{val} = 1$

