

1. a) $V_T: \{\text{boolean}, \text{char}, \text{integer}, \text{real}, \text{type_error}, \text{void}, \text{array}, \text{X}, \text{record}, \text{pointer}, \rightarrow$
 $\text{num}, \text{id}, '(', ')', \{, \}, ', '\}$

$V_N: \{T, I, F, P\}$

$S: T$

产生式: $T \rightarrow \text{boolean} / \text{char} / \text{integer} / \text{real} / \text{type_error} / \text{void}$

$T \rightarrow T \text{ X } T$

$\quad | \text{ pointer } ('T')$

$\quad | \text{ array } (' \{ I \} ', T)$

$\quad | \text{ record } ('F')$

$\quad | ('P') \rightarrow T$

$I \rightarrow \text{num} / I ', \text{num}$

$F \rightarrow F \text{ X } ('id \text{ X } T') / ('id \text{ X } T')$

$P \rightarrow T / P \text{ X } T$

b) 先对基本类型及构造符编码。(record采用名字等价,不用编码;而笛卡尔积 \times 也视为基本类型一同编码)

①

boolean	0000
char	0001
integer	0010
real	0011
type_error	0100
void	0101
\times	0110

pointer	01
array	10
\rightarrow	11

② 语法制导定义:

$T \rightarrow \text{boolean}$	{ $$$\$.code = "0000"$ }
$\quad \text{char}$	{ $$$\$.code = "0001"$ }
$\quad \text{integer}$	{ $$$\$.code = "0010"$ }
$\quad \text{real}$	{ $$$\$.code = "0011"$ }
$\quad \text{type_error}$	{ $$$\$.code = "0100"$ }
$\quad \text{void}$	{ $$$\$.code = "0101"$ }

$T \rightarrow T \times T$	{ $$$\$.code = "0110"$ }
$\quad \text{pointer}('T')$	{ $$$\$.code = \text{strcat}("01", \$3.code)$ }
$\quad \text{array}(\{I\}, T)$	{ $$$\$.code = \text{strcat}("10", \$7.code)$ }
$\quad ('P') \rightarrow T$	{ $$$\$.code = \text{strcat}("11", \$5.code)$ }

$I \rightarrow \text{num} / I, \text{num}$

$F \rightarrow F \times ('id \times T') \mid ('id \times T')$

$P \rightarrow T \mid P \times T$