

Q1

1.

语句 11 :

开作用域有两个:

全局作用域 (含符号 a0, b0, a2, foo)

foo 作用域 (含符号 a1, b1, bar)

语句 16 :

开作用域有两个:

全局作用域 (含符号 a0, b0, a2, foo, baz)

baz 作用域 (含符号 a3)

分析至语句 16 时, 访问的 a2 是在第 1 行语句声明的

2.

语句 11 :

开作用域有两个:

全局作用域 (含符号 a0, b0, a2, foo, baz)

foo 作用域 (含符号 a1, b1, bar)

至语句 16 时, 开作用域有两个:

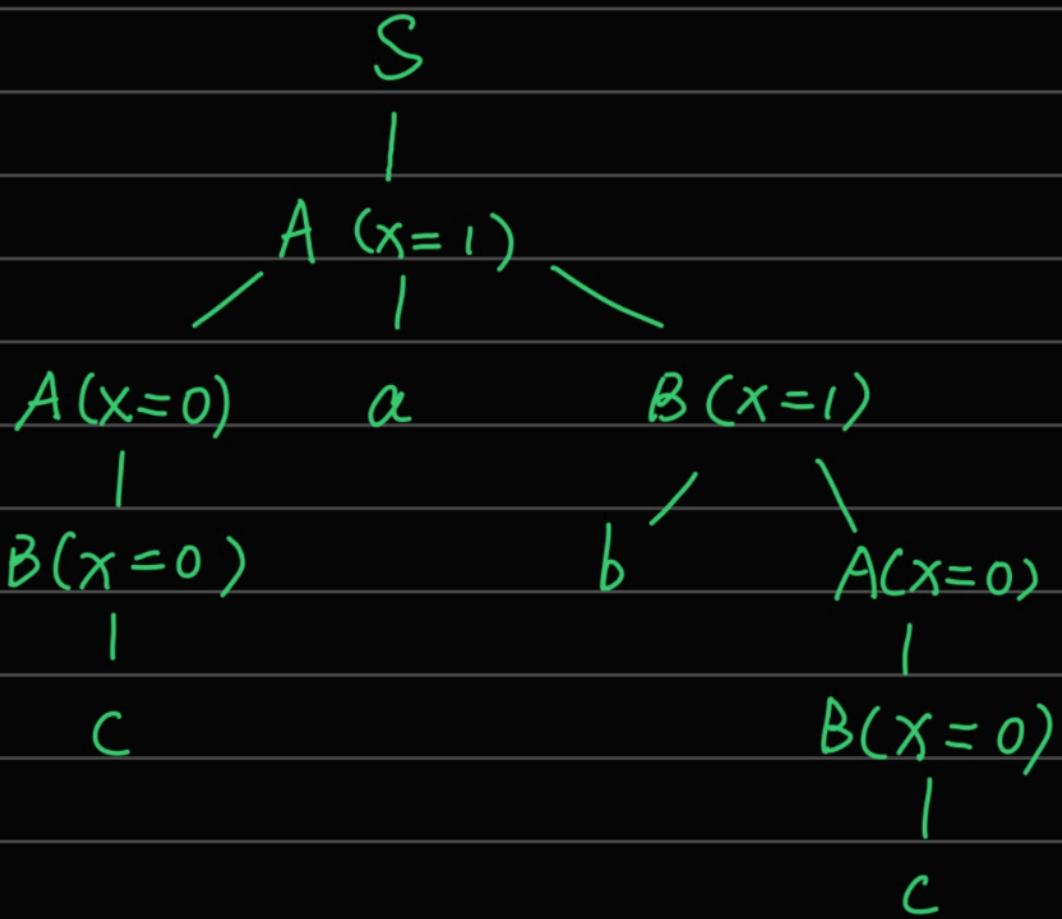
全局作用域 (含符号 a0, b0, a2, foo, baz)

baz 作用域 (含符号 a3)

Q2

1.

1.



2.

$S \rightarrow A \{ \text{print}(A.x) \}$

$A \rightarrow B \{ R.i := B.x \} R \{ A.x := R.s \}$

$R \rightarrow a B \{ R1.i := R.i + B.x \} R1 \{ R.s := R1.s \}$

$R \rightarrow \epsilon \{ R.s := R.i \}$

$B \rightarrow b A \{ B.x := A.x + 1 \}$

$B \rightarrow c \{ B.x = 0 \}$

3.

```

int parseR(int R_i) {
    int R1_i;
    switch (lookahead) {
        case 'a':
            matchToken('a');
            R1_i = R_i + parseB();
            return parseR(R1_i);
        case '#':
            return R_i;
        default:
            printf("syntax error\n");
            exit(1);
    }
}

```

Q3

1.

D 的两个产生式需要变换，因为 L 的继承属性无法确定地从栈上得到

变换后的翻译模式：

$$S \rightarrow D\{\text{print}(D.\text{width})\}$$

$$\begin{aligned} D \rightarrow D_1; T &\{L.\text{type} := T.\text{type}; L.\text{offset} := D_1.\text{width}; L.\text{width} := T.\text{width}\} L \\ &\{D.\text{width} := D_1.\text{width} + L.\text{num} \times T.\text{width}\} \end{aligned}$$

$$\begin{aligned} D \rightarrow MNT &\{L.\text{type} := T.\text{type}; L.\text{offset} := M.\text{width}; L.\text{width} := T.\text{width}\} L \\ &\{D.\text{width} := L.\text{num} \times T.\text{width}\} \end{aligned}$$

$$T \rightarrow \text{int}\{T.\text{type} := \text{int}'; T.\text{width} := 4\}$$

$$T \rightarrow \text{real}\{T.\text{type} := \text{real}'; T.\text{width} := 8\}$$

$$\begin{aligned} L \rightarrow &\{L_1.\text{type} := L.\text{type}; L_1.\text{offset} := L.\text{offset}; L_1.\text{width} := L.\text{width}\} L_1, id \\ &\{foo(id.name, L.\text{type}, L.\text{offset} + L_1.\text{num} \times L_1.\text{width}); L.\text{num} := L_1.\text{num} + 1\} \end{aligned}$$

$$L \rightarrow id \{foo(id.name, L.\text{type}, L.\text{offset}); L.\text{num} := 1\}$$

$$M \rightarrow \epsilon \{M.\text{width} := 0\}$$

$$N \rightarrow \epsilon$$

2.

$S \rightarrow D \{ \text{print}(v[\text{top}].\text{width}) \}$

$D \rightarrow D_1 ; T L \{ v[\text{top} - 3].\text{width} := v[\text{top} - 3].\text{width} + v[\text{top}].\text{num} \cdot v[\text{top} - 1].\text{width} \}$

$D \rightarrow M N T L \{ v[\text{top} - 3].\text{width} := v[\text{top}].\text{num} \cdot v[\text{top} - 1].\text{width} \}$

$T \rightarrow \text{int} \{ v[\text{top}].\text{type} := \text{'int'}; v[\text{top}].\text{width} := 4 \}$

$T \rightarrow \text{real} \{ v[\text{top}].\text{type} := \text{'real'}; v[\text{top}].\text{width} := 8 \}$

$L \rightarrow L_1, id$

$\{ \text{foo}(v[\text{top}].\text{name}, v[\text{top} - 3].\text{type}, v[\text{top} - 5].\text{width} + v[\text{top} - 2].\text{num} \cdot v[\text{top} - 3].\text{width});$
 $v[\text{top} - 2].\text{num} := v[\text{top} - 2].\text{num} + 1 \}$

$L \rightarrow id \{ \text{foo}(v[\text{top}].\text{name}, v[\text{top} - 1].\text{type}, v[\text{top} - 3].\text{width}); v[\text{top}].\text{num} := 1 \}$

$M \rightarrow \epsilon \{ v[\text{top} + 1].\text{width} := 0 \}$

$N \rightarrow \epsilon \{ \}$

3.

打印 8