

$D \rightarrow TL; \quad \{ L.i = T.type \}$

$T \rightarrow \underline{int} \quad \{ T.type = 'int' \}$

$T \rightarrow \underline{float} \quad \{ T.type = 'float' \}$

$L \rightarrow L_1, \underline{id} \quad \{ add_type(id.entry, L.i); \}$
 $L_1.i = L.i \}$

$L \rightarrow \underline{id} \quad \{ add_type(id.entry, L.i) \}$

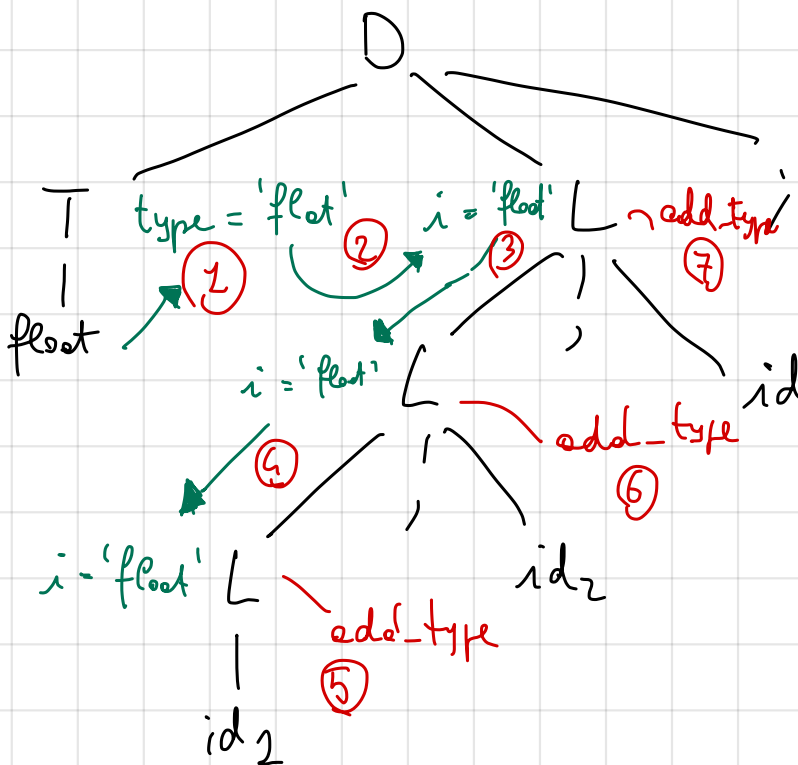
We suppose to have a function `add_type`:

$Id \times Type \rightarrow Void$

SDD

Sequence of operations in a DF visit of the tree

`float id1, id2, id3;`



- ① $T.type = 'float'$
- ② $L.i = T.type$
- ③ $L_1.i = L.i$
- ④ $L_2.i = L.i$
- ⑤ $add_type(id_1, 'float')$
- ⑥ $add_type(id_2, 'float')$
- ⑦ $add_type(id_3, 'float')$

Grammar for floating point literals in binary digits

e.g. $101.101 \rightarrow 1 \cdot 2^{-1} + 0 \cdot 2^{-2} + 1 \cdot 2^{-3} = *$

\swarrow
 $1 \cdot 2^0 + 0 \cdot 2^1 + 1 \cdot 2^2 = 1 + 0 + 4 =$

$* \frac{1}{2} + 0 + \frac{1}{2^3} = \frac{1}{2} + \frac{1}{8} = \frac{4+1}{8} = \frac{5}{8} = 0.625$

Value = $5 + 0.625 = 5.625$

$$S \rightarrow L_1 \cdot L_2 \quad \left\{ \begin{array}{l} L_1 \cdot \text{exp} = 0; \\ S \cdot \text{val} = L_1 \cdot \text{ival} + L_2 \cdot \text{dval} \end{array} \right\}$$

$$S \rightarrow L \quad \left\{ \begin{array}{l} L \cdot \text{exp} = 0; \\ S \cdot \text{val} = L \cdot \text{ival} \end{array} \right\}$$

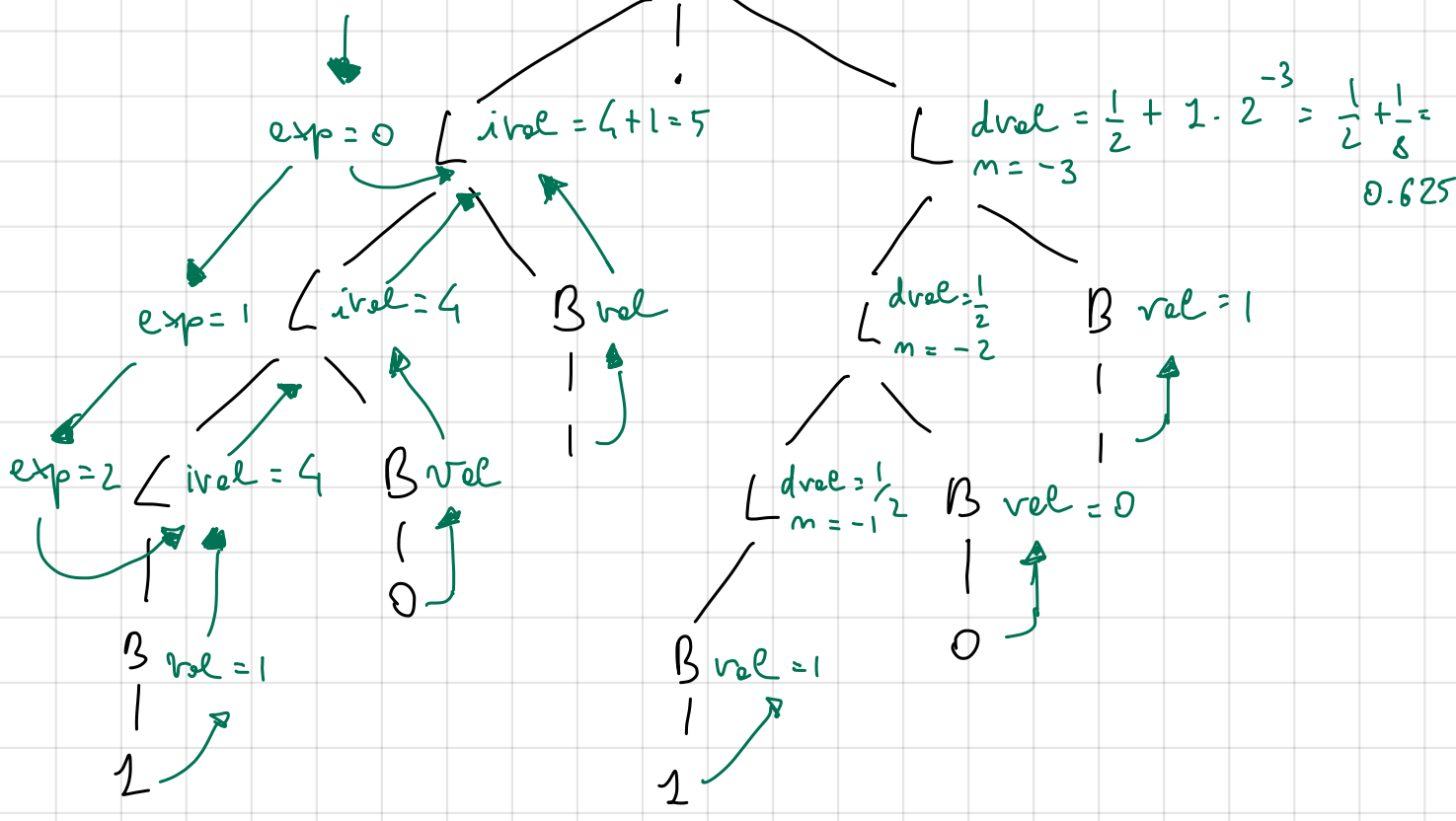
$$L \rightarrow L_1 B \quad \left\{ \begin{array}{l} L_2 \cdot \text{exp} = L \cdot \text{exp} + 1; \\ L \cdot \text{ival} = L_1 \cdot \text{ival} + B \cdot \text{val} \cdot 2^{L \cdot \text{exp}} \\ L \cdot \text{m} = L_1 \cdot \text{m} - 1 \\ L \cdot \text{dval} = L_2 \cdot \text{dval} + B \cdot \text{val} \cdot 2^{L \cdot \text{m}} \end{array} \right\}$$

$$L \rightarrow B \quad \left\{ \begin{array}{l} L \cdot \text{ival} = B \cdot \text{val} \cdot 2^{L \cdot \text{exp}}; \\ L \cdot \text{m} = -2; \\ L \cdot \text{dval} = B \cdot \text{val} \cdot 2^{L \cdot \text{m}} \end{array} \right\}$$

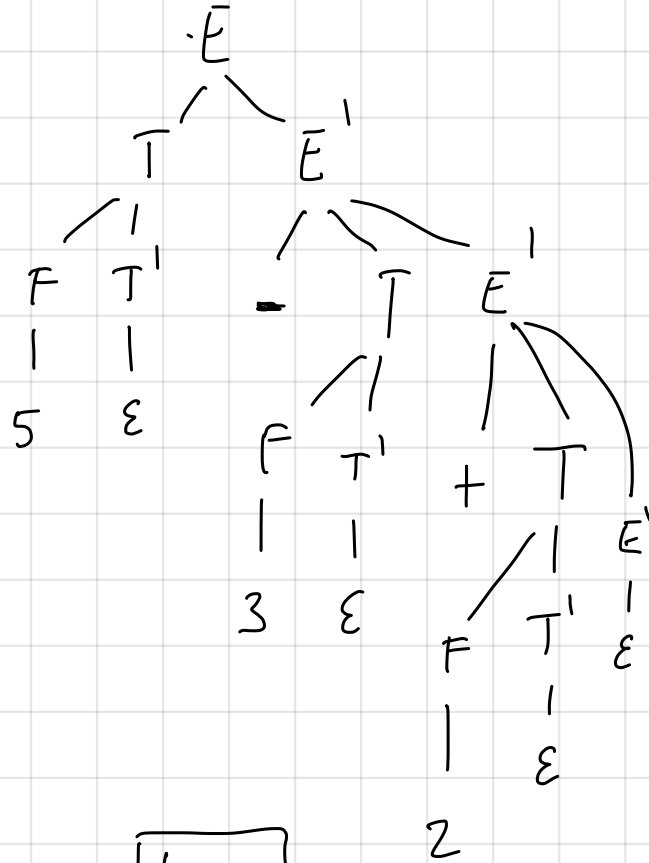
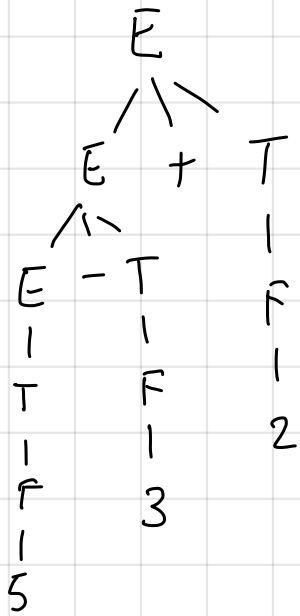
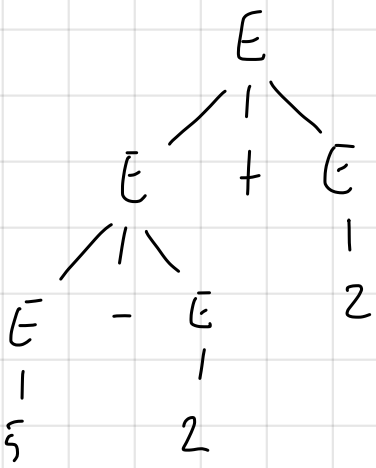
$$B \rightarrow 0 \quad \left\{ \begin{array}{l} B \cdot \text{val} = 0 \end{array} \right\}$$

$$B \rightarrow 1 \quad \left\{ \begin{array}{l} B \cdot \text{val} = 1 \end{array} \right\}$$

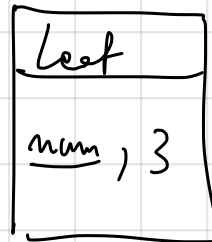
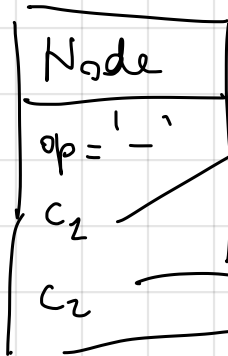
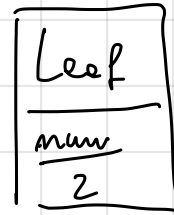
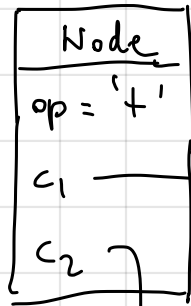
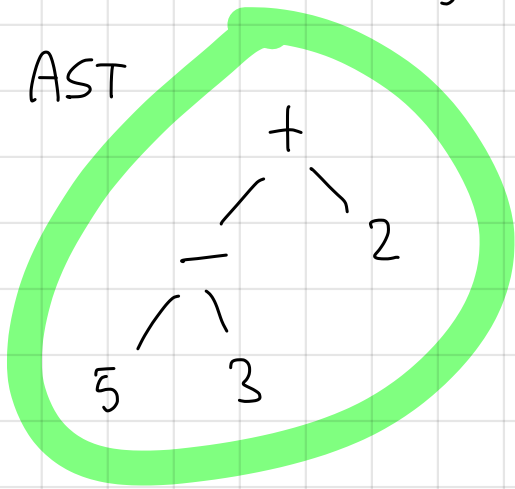
$$S \quad \text{val} = 5 + 0.625 = 5.625$$



$$5 - 3 + 2$$



AST



$$E \rightarrow E_1 + T \{ E.mode = Node('+', E_1.mode, T.mode) \}$$

$$E \rightarrow E_1 - T \{ E.mode = Node('-', E_1.mode, T.mode) \}$$

$$E \rightarrow T \{ E.mode = T.mode \}$$

$$T \rightarrow T * F \{ \dots \}$$

$$T \rightarrow T / F \{ \dots \}$$

$$T \rightarrow F \{ T.mode = F.mode \}$$

$$F \rightarrow \underline{num} \{ F.mode = Leaf(\underline{num}, \underline{num}.lexvalue) \}$$

$$F \rightarrow \underline{id} \{ \dots \}$$

$$F \rightarrow (E) \{ \dots \}$$

