

# POSTFIX NOTATION

STD

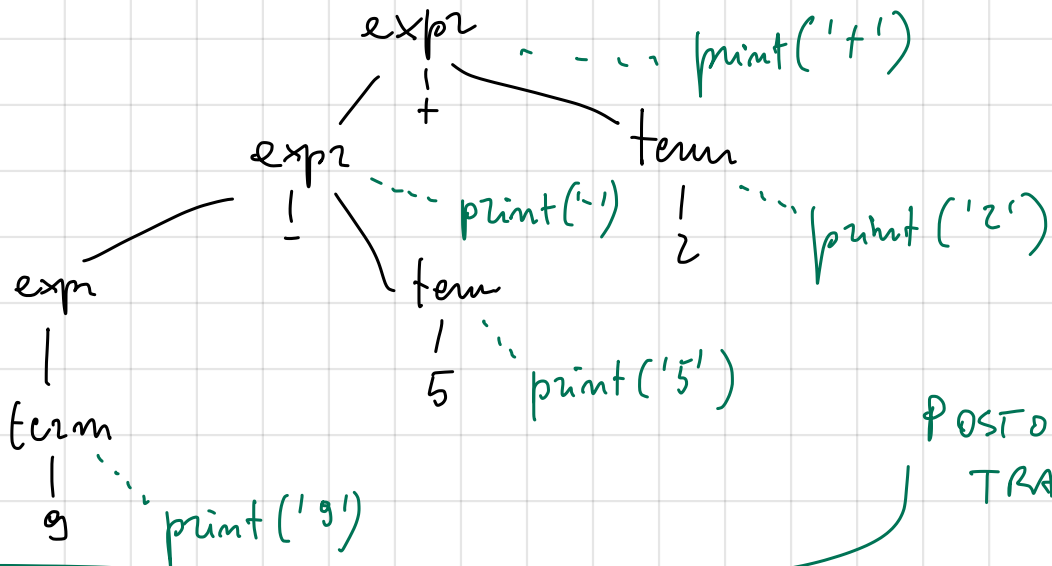
$expr \rightarrow expr_1 + term \{ print(' + ') \}$

$expr \rightarrow expr_1 - term \{ print(' - ') \}$

$expr \rightarrow term$

$term \rightarrow 0 \{ print(' 0 ') \}$

$term \rightarrow 9 \{ print(' 9 ') \}$   $9 - 5 + 2$



$print(' 9 ') \quad print(' 5 ') \quad print(' - ') \quad print(' 2 ') \quad print(' + ')$   
 $\rightarrow 9 5 - 2 +$       POSTFIX notation

The execution of the actions can be implemented during the execution of the BOTTOM-UP shift-reduce parser for the grammar (exercise!)

# PREFIX NOTATION

$$9 * 5 + 2 \longrightarrow \underline{\underline{+ * 9 5 2}}$$

$$\textcircled{+} \textcircled{*} 9 5 2 \$$$

→

→

→ 9

→ 5

$$9 * 5 = \textcircled{45}$$

$$45 + 2 = \textcircled{47}$$

→ (2)

SDT for translating INFIX to PREFIX notation

→  $M_1$

$$E \rightarrow \{ \text{print('+' )} \} E_1 + T$$

$$E \rightarrow T$$

$$T \rightarrow \{ \text{print('*' )} \} T_1 * F$$

$$T \rightarrow F$$

$$F \rightarrow \underline{\text{digit}} \{ \text{print(digit.lexvalue)} \}$$

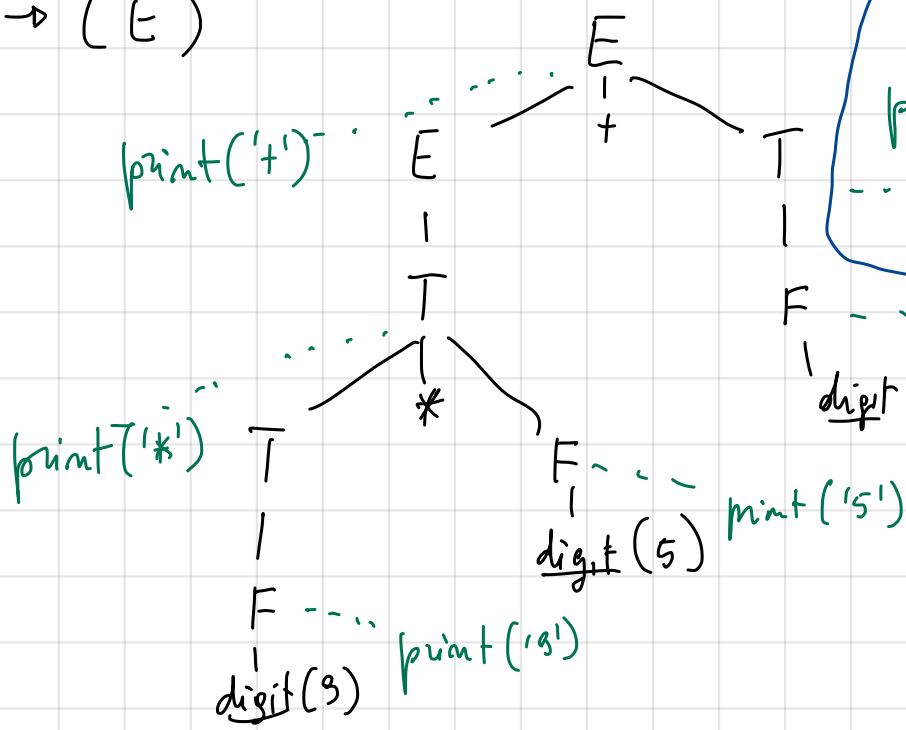
$$F \rightarrow (E)$$

The grammar is NOT LL(2) and is NOT LR(1)!

$$M_1 \rightarrow \epsilon \{ - \}$$

$$M_2 \rightarrow \epsilon \{ - \}$$

$$M_3 \rightarrow \epsilon \{ = \}$$



DF traversal:  
 print('+') print('\*') ..  
 .. print('9') print('5') ..  
 print('2')

+ \* 9 5 2

$$E \rightarrow E_2 + T \quad \{ E.val = E_2.val + T.val \}$$

$$E \rightarrow T \quad \{ E.val = T.val \}$$

$$T \rightarrow T_1 * F \quad \{ T.val = T_1.val * F.val \}$$

$$T \rightarrow F \quad \{ T.val = F.val \} \quad \text{POSTFIX SOT} \equiv \text{SOD}$$

$$F \rightarrow \text{digit} \quad \{ F.val = \text{digit}.lexvalue \}$$

$$F \rightarrow (E) \quad \{ F.val = E.val \}$$

S-attributed

$$A \rightarrow A\alpha \mid \beta \quad \rightarrow \quad A \rightarrow \beta A'$$

Elimination of  
Left Recursion

$$A' \rightarrow \alpha A' \mid \epsilon$$

$$E \rightarrow T \quad \{ \underline{E.val = T.val} \} \quad E'$$

$$E' \rightarrow + T \quad \{ E.val = E_2.val + T.val \} \quad E'$$

$$E' \rightarrow \epsilon$$

⋮

NSD



$$E \rightarrow T \{ E.i = T.val \} \quad E' \{ E.val = E'.s \}$$

$$E' \rightarrow + T \{ E'_2.i = E'.i + T.val \} \quad E'_2 \{ E'.s = E'_2.s \}$$

$$E' \rightarrow \epsilon \{ E'.s = E'.i \}$$

$$T \rightarrow F \{ T.i = F.val \} \quad T' \{ T.val = T'.s \}$$

$$T' \rightarrow * F \{ T'_2.i = T'.i * F.val \} \quad T'_2 \{ T'.s = T'_2.s \}$$

$$T' \rightarrow \epsilon \{ T'.s = T'.i \}$$

$$F \rightarrow \text{digit} \{ F.val = \text{digit}.lexval \}$$

$$F \rightarrow (E) \{ F.val = E.val \}$$

$$9 * 5 + 2$$

