

### Simple Grammar

$$S \rightarrow E \$$$
$$E \rightarrow T + E$$

for  
expression

$$E \rightarrow T$$

$$T \rightarrow F * T$$

$$T \rightarrow F$$

$$F \rightarrow ( E )$$

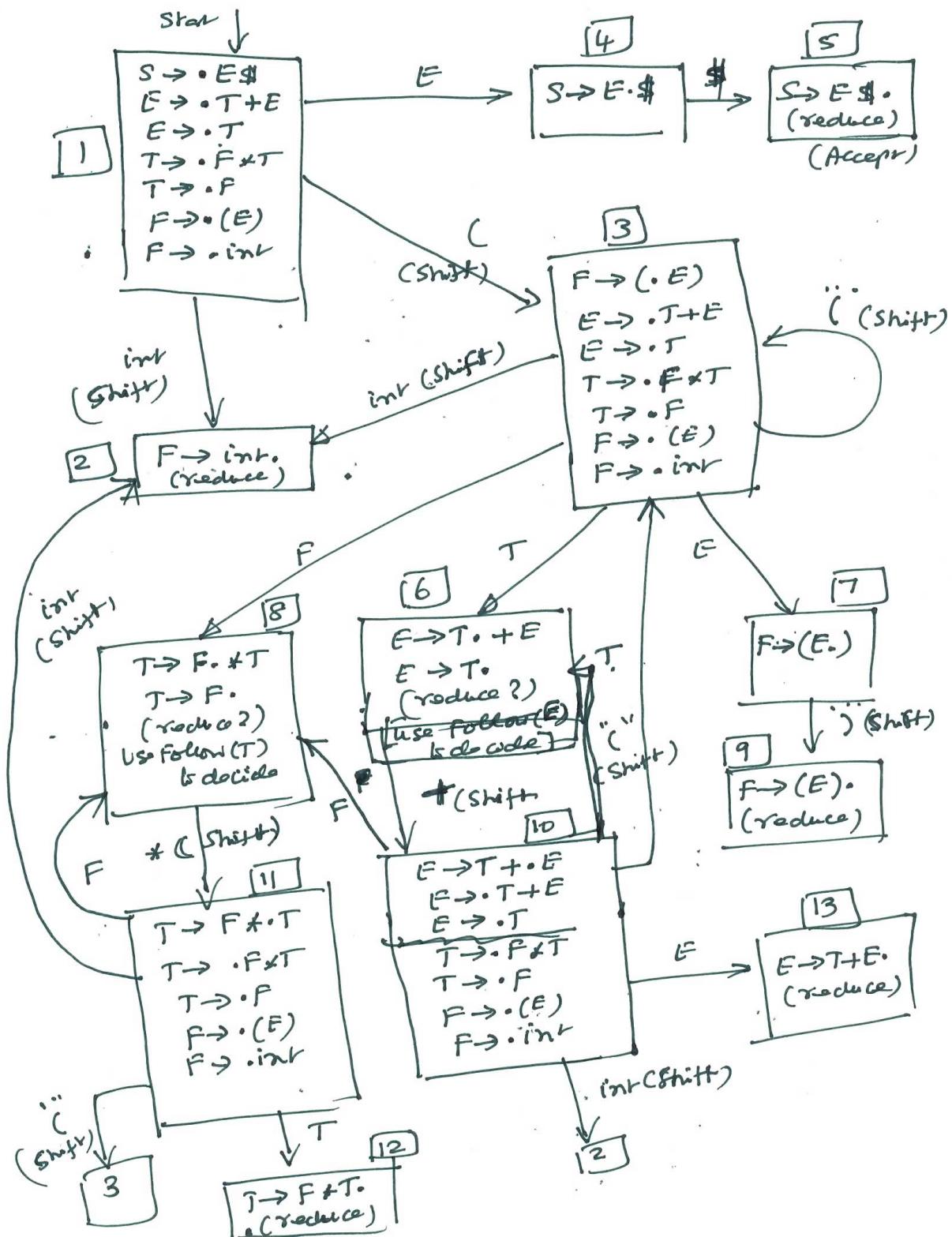
$$F \rightarrow (\underline{\underline{int}})$$

$$\underline{\underline{int \times int + (int \times int) \$}}$$

Dotted  
production  
rules

$$\left\{ \begin{array}{l} S \rightarrow \cdot E \$ \\ S \rightarrow E \cdot \$ \\ S \rightarrow E \$ \end{array} \right.$$

Reduce



$$\text{Follow}(E) = [\$, ()], \text{Follow}(T) = \text{Follow}(E) \cup \{+\} = [\$, (), +]$$

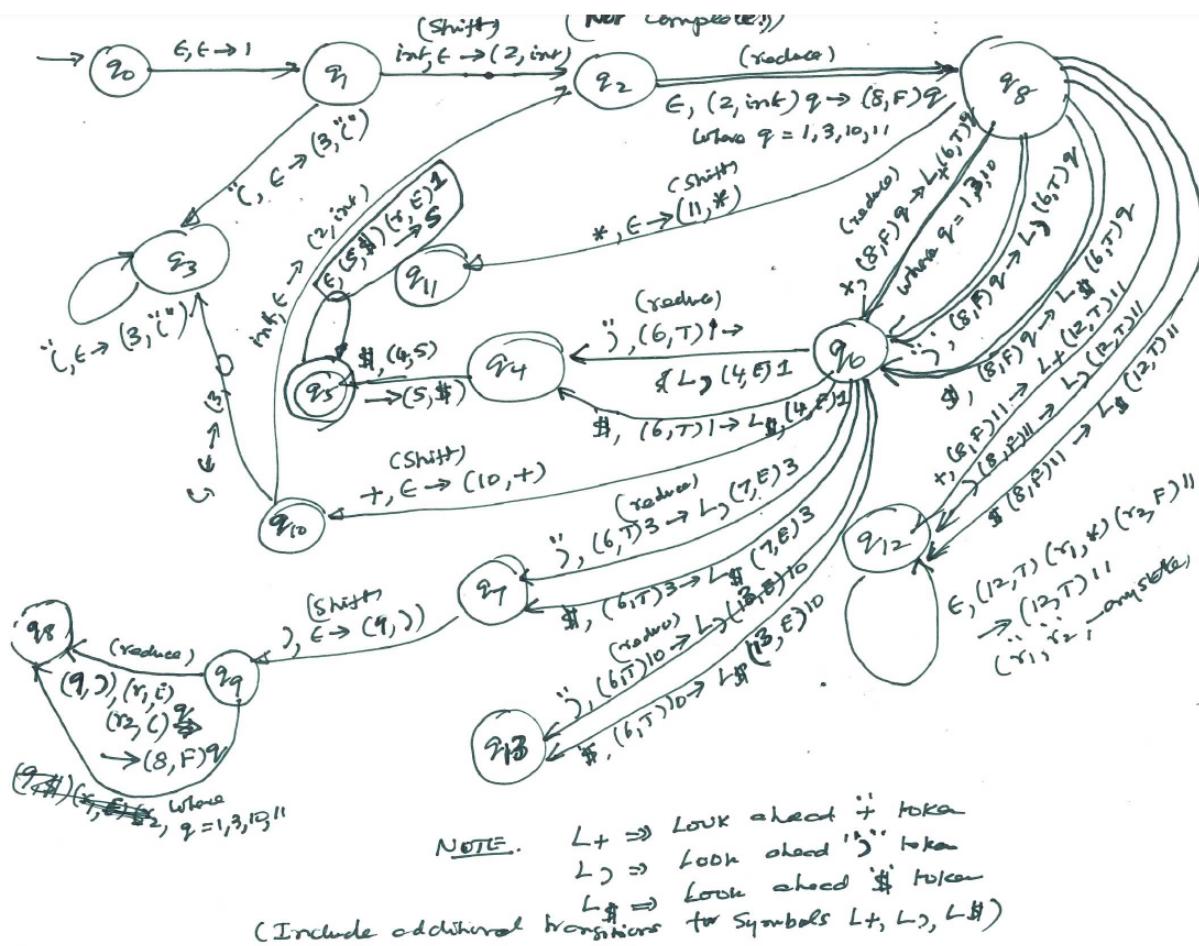
$$\text{Follow}(F) = \text{Follow}(T) \cup \{*\} = [\$, (), +, *]$$

	<u>Input</u>	<u>Look ahead</u> (R)						<u>Top of Stack</u>		
State	E	*	+	*	(	)	\$	F	T	E
start										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										

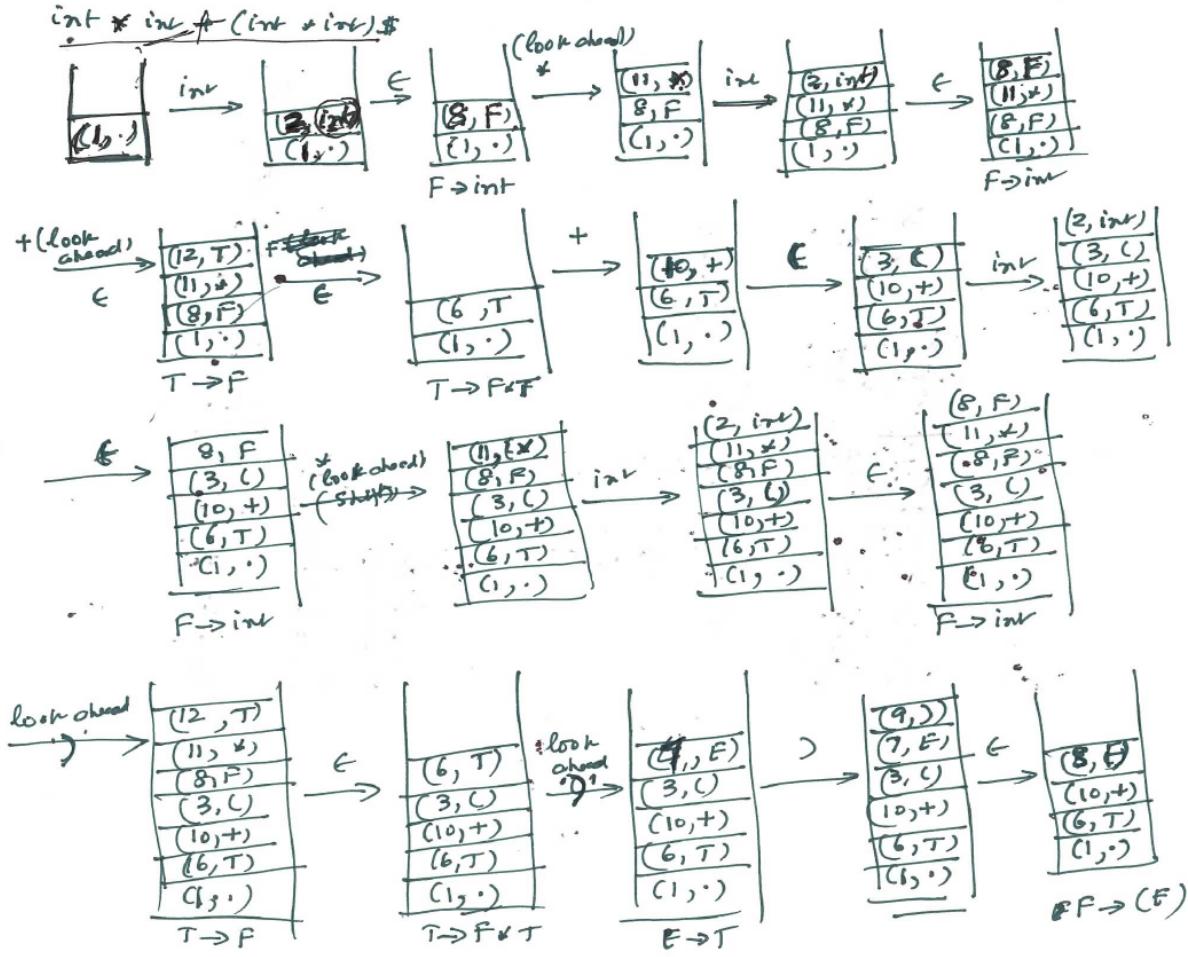
Annotations:

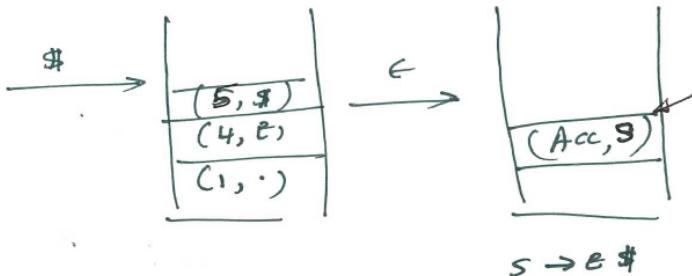
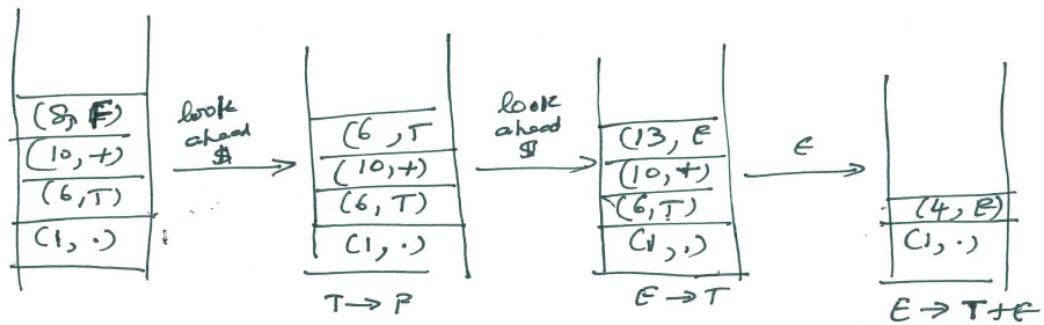
- Row 1: Initial state.
- Row 2: State 2. Action:  $f \rightarrow int$ .
- Row 3: State 3. Action:  $S_2$ .
- Row 4: State 4. Action:  $S_5$ .
- Row 5: State 5. Action:  $S \rightarrow E \$$ .
- Row 6: State 6. Action:  $\cancel{S_{10}}$ . Redaction:  $E \rightarrow T$ ,  $E \rightarrow T$ .
- Row 7: State 7. Action:  $\cancel{T \rightarrow F}$ . Redaction:  $S_9$ .
- Row 8: State 8. Action:  $\cancel{T \rightarrow F}$ ,  $\cancel{T \rightarrow F}$ .
- Row 9: State 9. Action:  $F \rightarrow (E)$ .
- Row 10: State 10. Action:  $S_2$ . Redaction:  $S_3$ .
- Row 11: State 11. Action:  $\cancel{S_2}$ . Redaction:  $S_3$ .
- Row 12: State 12. Action:  $T \rightarrow F \times T$ .
- Row 13: State 13. Action:  $E \rightarrow T+E$ .

Following PDA diagram not complete!!



PDA processing for the example string : int \* int + (int \* int)\$





Derivation steps:

$$\begin{aligned}
 S &\rightarrow E \$ \rightarrow T + E \$ \rightarrow T + T \$ \rightarrow T + F \$ \rightarrow T + (E) \$ \rightarrow T + (T + (T)) \$ \\
 &\rightarrow T + (E \times T) \$ \rightarrow T + (F \times T) \$ \rightarrow T + (F \times (F \times T)) \$ \rightarrow T + (F \times (F \times (F \times T))) \$ \\
 &\rightarrow T + (F \times T) + (int \times int) \rightarrow F \times F + (int \times int) \rightarrow F \times F + (int \times int) + (int \times int) \\
 &\rightarrow F \times F + (int \times int) + (int \times int)
 \end{aligned}$$