

$S \rightarrow SbS \mid a$ Derive the string "a b a b a b a"

$S \rightarrow \overset{\checkmark}{S}bS$

$\rightarrow \underline{a}bS (S \rightarrow a)$

$\rightarrow abSbS (S \rightarrow SbS)$

$\rightarrow ababS (S \rightarrow a)$

$\rightarrow ababSbS (S \rightarrow SbS)$

$\rightarrow \underline{abababS} (S \rightarrow a)$

$\rightarrow \underline{abababab} (S \rightarrow a)$

$S \not\rightarrow a \text{ (final)}$
X

$S \rightarrow a$ X

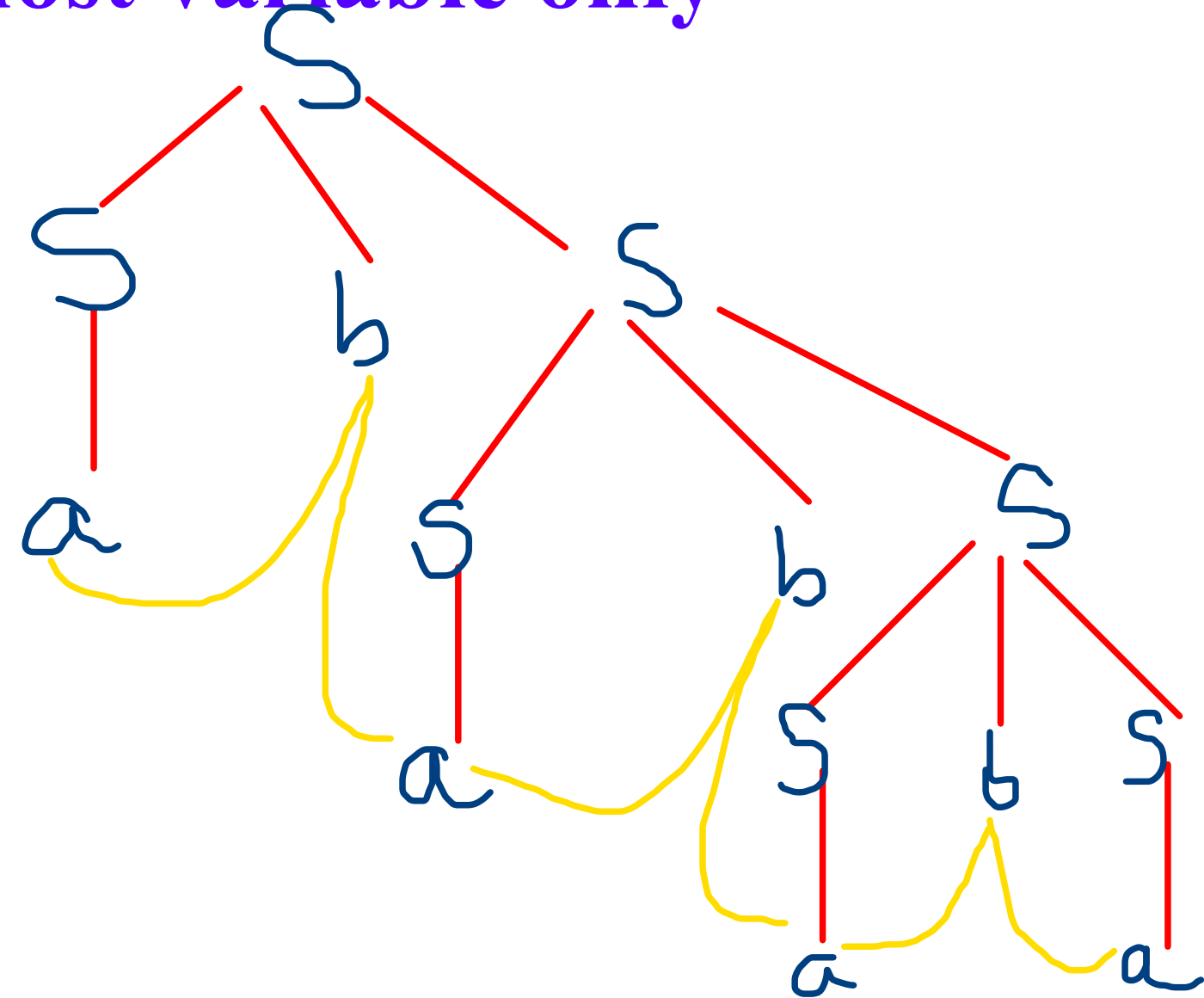
ababab

$S \rightarrow SbS \mid a$
"abababa"

$S \rightarrow SbS$
 $\rightarrow abS$ ($S \rightarrow a$)
 $\rightarrow abSbS$ ($S \rightarrow SbS$)
 $\rightarrow ababS$ ($S \rightarrow a$)
 $\rightarrow ababSbS$ ($S \rightarrow SbS$)
 $\rightarrow abababS$ ($S \rightarrow a$)
 $\rightarrow abababa$ ($S \rightarrow a$)

Left Most Derivation

A derivation if on every step
production rule is applied to the
left most variable only



S->SbS | a
"abababa"

Right Most Derivation

A derivation is on every step production rule is applied to the Right most variable only

S->SbS (S->SbS)

->Sba (S->a)

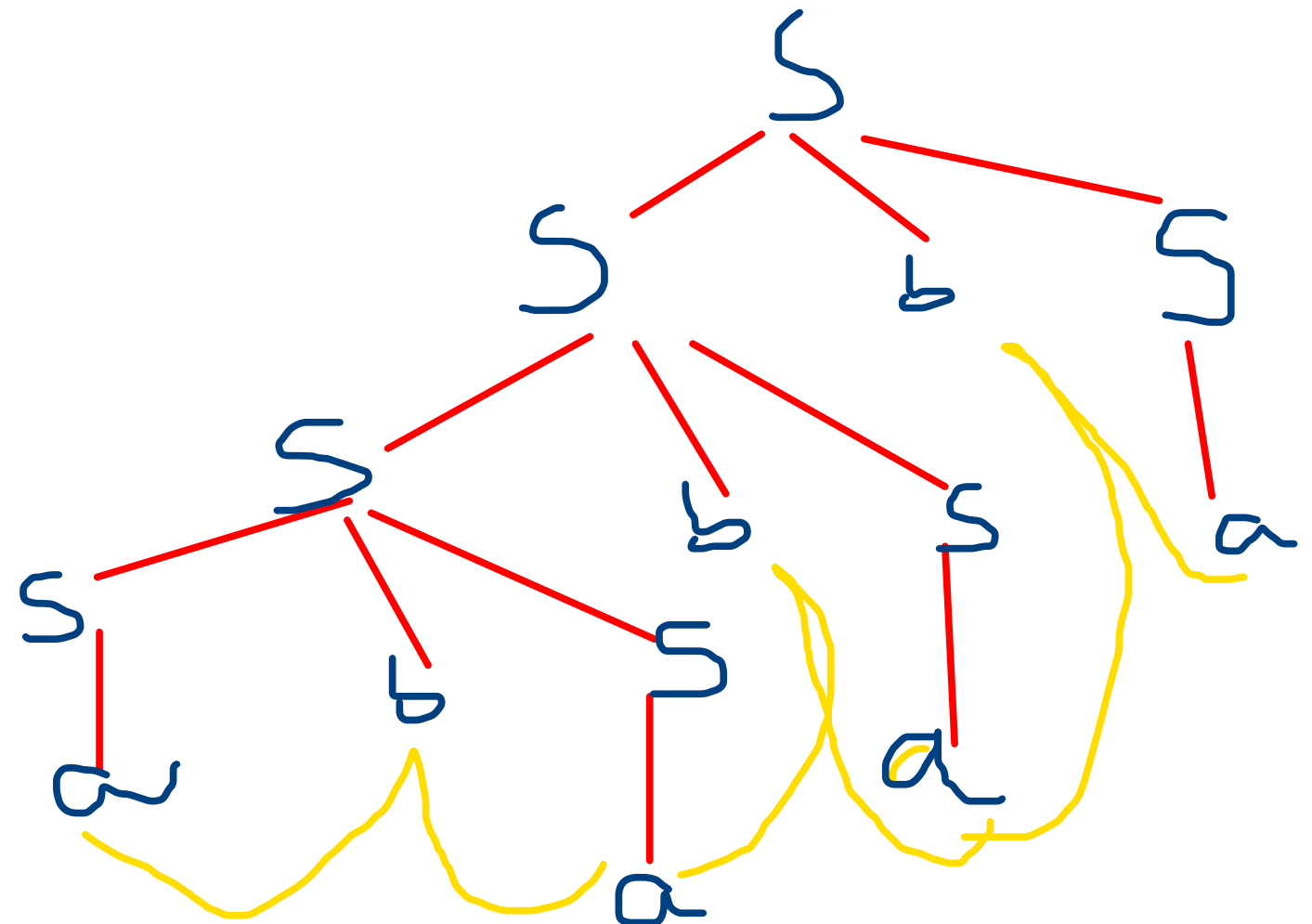
->SbSba (S->SbS)

->Sbaba (S->a)

->SbSbaba (S->SbS)

->Sbababa (S->a)

->abababa (S->a)



$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow id$

such type of G are used for
arithmetic expression

$2+3*4$

Use right most derivation
to derive the string

$id + id * id$

$E \rightarrow E * E$

$\rightarrow E * id$

$\rightarrow E + E * id$

$\rightarrow E + id * id$

$\rightarrow id + id * id$

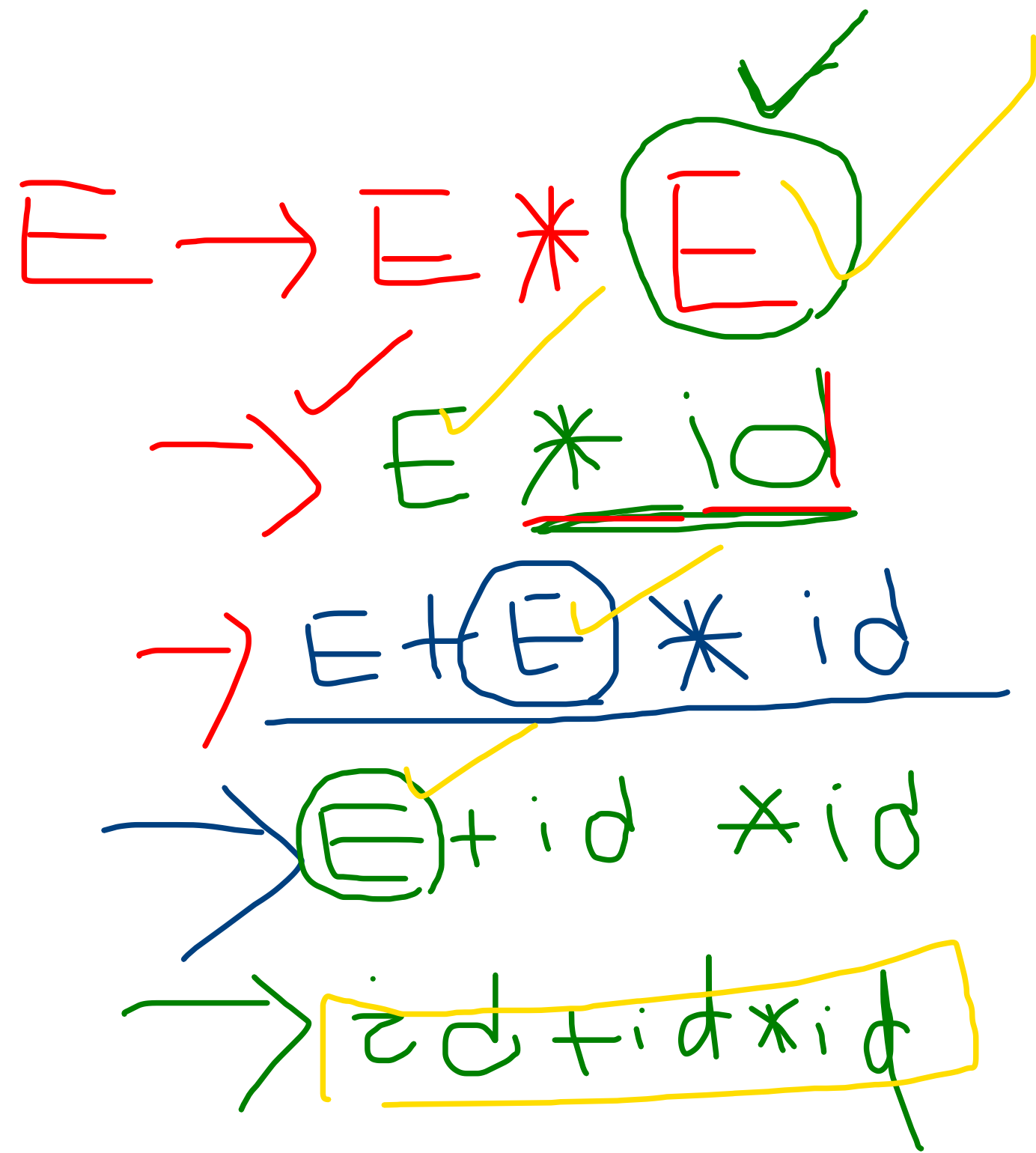
$E \rightarrow E + E$

$E \rightarrow E * E$

$E \rightarrow id$

"id + id * id"

$E \rightarrow E + E \mid E * E \mid id$



Ambiguous Grammar Confusing, more than one option

Left most

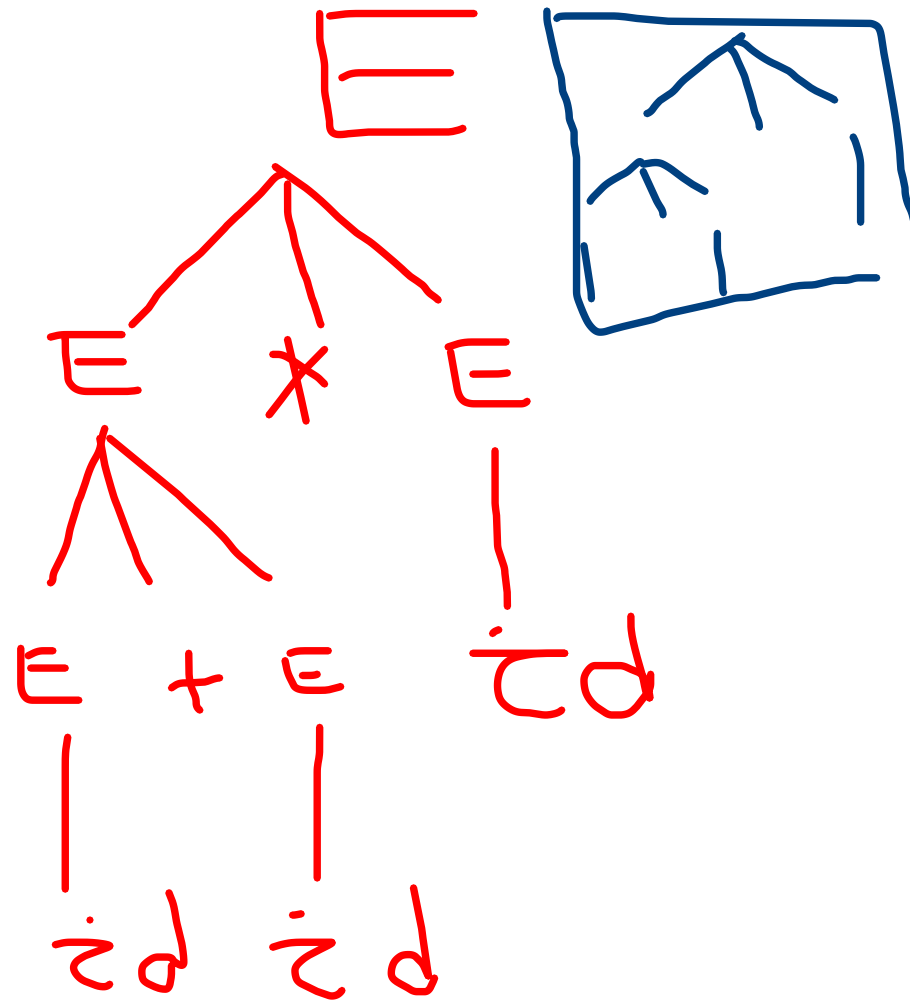
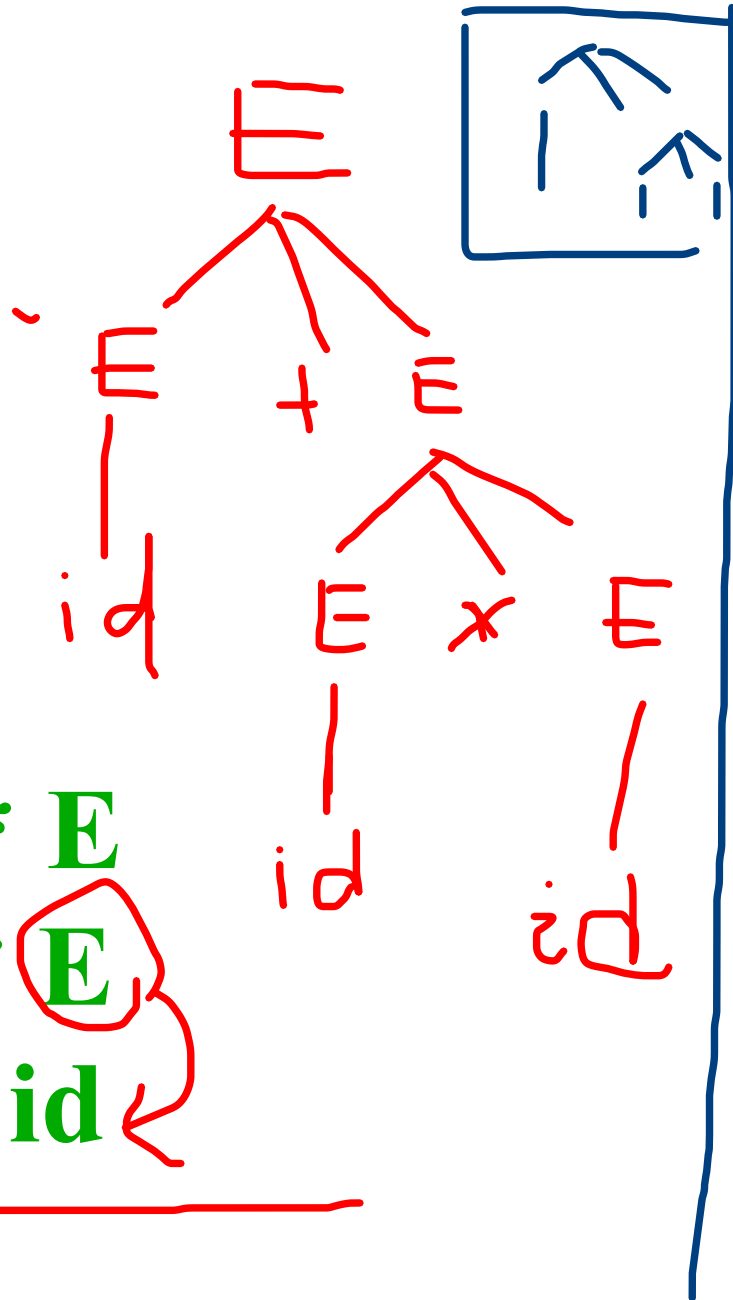
$E \rightarrow E + E$

$\rightarrow id + E$

$\rightarrow id + E * E$

$\rightarrow id + id * E$

$\rightarrow id + id * id$



Right most

$E \rightarrow E * E$

$\rightarrow E * id$

$\rightarrow E + E * id$

$\rightarrow E + id * id$

$\rightarrow id + id * id$