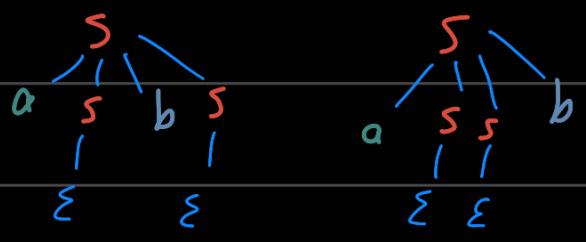
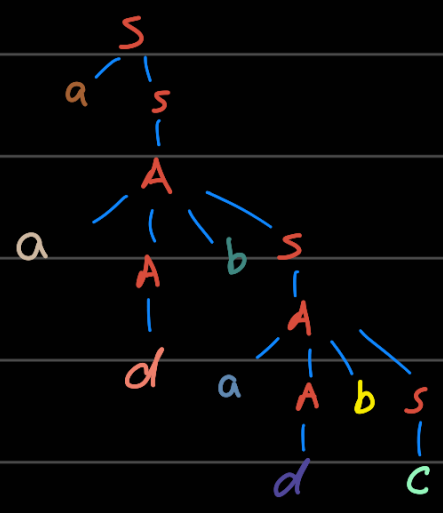
①

S : a b

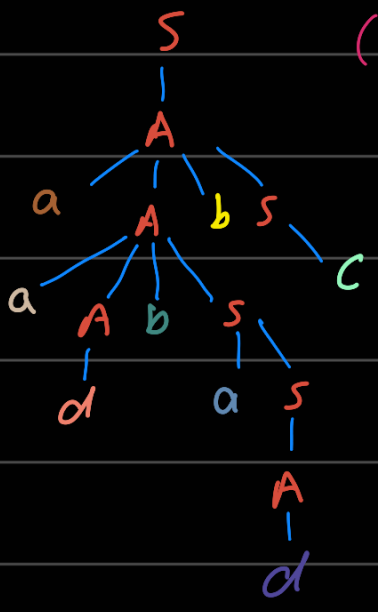


(A

S : a a d b a d b c



(B



②

(A

$S \rightarrow SaS \mid AbS \rightarrow S \rightarrow AbSS'$

$S' \rightarrow aSS' \mid \varepsilon$

$A \rightarrow SaA \mid B$

$B \rightarrow bS \mid c$

$\Rightarrow S \rightarrow AbSS'$

$S' \rightarrow aSS' \mid \varepsilon$

$A \rightarrow BA'$

$A' \rightarrow bSS'aAA' \mid \varepsilon$

$B \rightarrow bS \mid c$

(1)

$S \to abcA \mid abcB \mid abC$

$A \to abA \mid abBA \mid abBC$

$B \to b$

$C \to c$

(2)

$S \to abS'$

$S' \to cA \mid cB \mid C$

$A \to abA \mid abBA \mid abBC$

$B \to b$

$C \to c$

(B

(3)

$S \to abS'$

$S' \to cA \mid cB \mid C$

$\Rightarrow A \to abA'$

$A' \to A \mid BA \mid BC$

$B \to b$

$C \to c$

(4)

$S \to abS'$

$\Rightarrow S' \to cS'' \mid C$

$S'' \to A \mid B$

$A \to abA'$

$A' \to A \mid BA \mid BC$

$B \to b$

$C \to c$

(5)

$S \to abS'$

$S' \to cS'' \mid C$

$S'' \to A \mid B$

$\Rightarrow A \to abA'$

$A' \to A \mid BA''$

$A'' \to A \mid C$

$B \to b$

$C \to c$

3

First(program) = {{} , Follow(program) = {eof} (A

First(Statements) = {ε, id, if}, Follow(Statements) = {}}

First(Statement) = {id, if}, Follow(Statement) = {id, if, ε}

First(Expression) = {id}, Follow(Expression) = {; ,)}

First(Tail) = {+ , - , ε}, Follow(Tail) = {; ,)}

(B

```
program()
  if ch = "{" then match("{") Statements(); then match("}")
  then match(eof)

Statements()
  if ch = "id" or ch = "if" then Statement(); then Statements(); <- if, id
  else if ch = "}" then return(); <- ε

Statement()
      if ch = "id" then match(id) then if ch = "=" then match("=")
      Expression(); then if ch = ";" match(";")
    else if ch = "if" then match("if") then if ch = "(" match("(") then
      Expression(); the if ch = ")" then match(")") then Statement();
```

```
else print("Error"); then exit(1);
```

```
Expression()
    if ch = "id" then match('id') the Tail();
```

```
Tail()
    if ch = "+" then Expression();
    else if ch = "-" then Expression();
    else if ch = ")" or ch = "eof" then return();
    else print("Error"); then exit(1);
```

④

First(S) = {id, if} Follow(S) = {$}

First(I) = {=, ε} Follow(I) = {$}

First(E) = {(, id, num} Follow(E) = {$, then,)}

First(E') = {+, ε} Follow(E') = {$,), then}

First(T) = {(, id, num} Follow(T) = {$,), then, +}

First(T') = {*, ε} Follow(T') = {$,), then, +}

First(F) = {(, id, num} Follow(F) = {$,), then, +, *}

(A

(: C, B نمی‌تواند

⑤

$S \to G$

$G \to P \mid PG$

$P \to id = R$

$R \to id\ R \mid \varepsilon$

$\Rightarrow$

$S \to G$

$G \to PG'$

$G' \to G \mid \varepsilon$

$P \to id = R$

$R \to id\ R \mid \varepsilon$

(A

(B

$S \to G$

$G \to PG'$

$G' \to G \mid \varepsilon$

$P \to id = R$

$R \to id\ R \mid \varepsilon$

$First(S) = \{id\}$ $Follow(S) = \{\$\}$

$First(G) = \{id\}$ $Follow(G) = \{\$\}$

$First(G') = \{\varepsilon, id\}$ $Follow(G') = \{\$\}$

$First(P) = \{id\}$ $Follow(P) = \{\$, id\}$

$First(R) = \{id, \varepsilon\}$ $Follow(R) = \{id\}$

(C

	id	=	$
S	$\to G$		
G	$\to PG'$		
G'	$\to G$		$\to \varepsilon$
P	$\to id = R$		$\to id = R$
R	$\to id = R$ $\to \varepsilon$		$\to \varepsilon$

LL(1) نمی باشد