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FLA Worksheet-1,2

RA2111031010047
Aryan Singh
R2 ; CSE-IT

Q1) S → NPVP
NP → Det N | 'Arjun'
VP → VNP | VP PP
PP → P NP
Det → 'a' | 'the'
N → 'tiger' | 'forest'
V → 'hunte'.
P → 'in.'

Left recursion:
it occurs when a non-terminal | A can derive itself directly or indirectly.

→ S → NP VP
NP → Det N NP' | 'Arjun' NP'
NP' → ε | NNP'
VP → V NPVP' | VP'PP
VP' → ε | NP VP'
PP → PNP
Det → 'a' | 'the'
N → 'tiger' | 'forest'
V → 'hunte'.
P → 'in'.

b) No null productions.

c) No unit productions.

(Q2) CNF:-

$S \to AB$

$A \to DN \mid a$

$B \to VA \mid BX$

$X \to PA$

$D \to b \mid c$

$N \to d \mid e$

$V \to f$

$P \to g$

$NP \to A$, $VP \to B$

$Det \to D$, $N \to N$

'Arjun' $\to a$

$V \to V$, $PP \to P$

'a' $\to b$, 'the' $\to c$

'tiger' $\to d$, 'forest' $\to e$

'hunte' $\to f$, 'in' $\to g$

- Convert to GNF:-

$A \to a\alpha$

$A \to$ non terminal, $\alpha \to$ string of non terminal.

$S \to a_1 a_2$

$NP \to a_3 a_4 \mid$ 'Arjun'

$VP \to a_5 a_6 \mid a_5 a_7$

$PP \to a_8 a_4$

$Det \to$ 'a' | 'the'

$N \to$ 'tiger' | 'forest'

$V \to$ 'hunte'

$P \to$ 'in'

a) Leftmost Derivation

"while a<b do c=d"

Stmt $\underset{lm}{\Rightarrow}$ while cond do stmt.

$\underset{lm}{\Rightarrow}$ while id relop id do stmt.

$\underset{lm}{\Rightarrow}$ while a<b do stmt

$\underset{lm}{\Rightarrow}$ while a<b do id = Expr

$\underset{lm}{\Rightarrow}$ while a<b do c = Expr.

$\underset{lm}{\Rightarrow}$ while a<b do c=d

$\underset{lm}{\Rightarrow}$

$\boxed{\text{Stmt} \overset{*}{\underset{lm}{\Rightarrow}} \text{while } (a<b \text{ do } c=d.}$

b) Rightmost derivation:-

If a>b then c=d*e

Stmt $\underset{rm}{\Rightarrow}$ if cond then stmt.

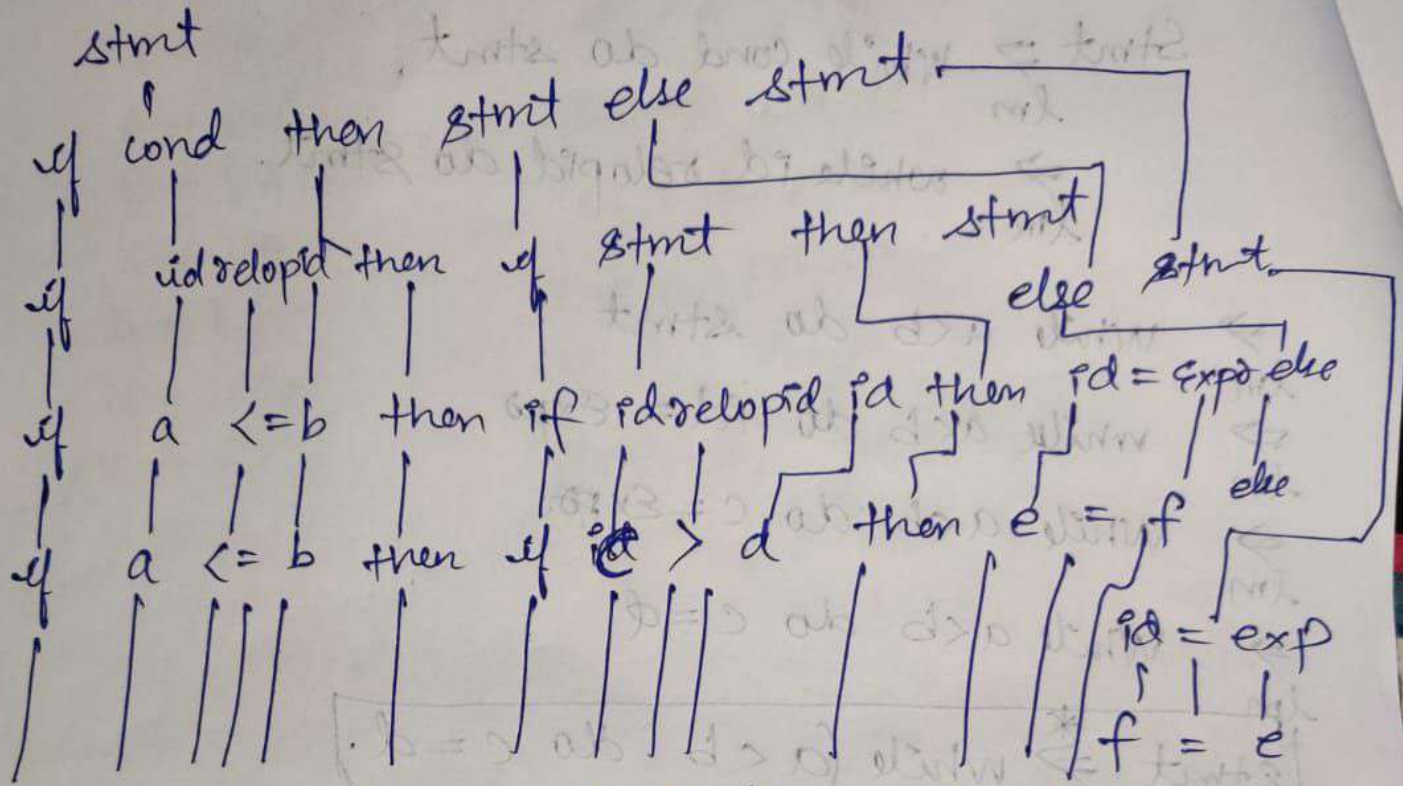
$\underset{rm}{\Rightarrow}$ if cond then id = Expr.

$\underset{rm}{\Rightarrow}$ if cond then id = d*e

$\underset{rm}{\Rightarrow}$ if cond then c = d*e

$\boxed{\text{Stmt} \overset{*}{\underset{rm}{\Rightarrow}} \text{if } a>b \text{ then } c=d*e}$

c) By parse tree.



if a <= b then if c > d then e = f else
f = e

if two deff. form exist its ambiguous.

Q3)

A) All of these grammars generate languages containing strings composed of 'w' & 'v' the patterns in these lang. involve comb^n's of 'w' & 'v'.

$L = \{wv, wvv, wwvv, wwwvv, \ldots\}$

B) pair of grammars generating the same lang. are:

Grammar 1 $(S \to wvS \mid wv)$

Grammar 7 $(S \to wV;\ V \to VS \mid V)$

Grammar 1 $\to (S \to wvS \mid wv)$

$wv, wwvv, wvvv, \ldots$

Grammar 7 $\to (S \to wV;\ V \to VS \mid V)$

$wV, wwVV, wVVV, \ldots$

C) Convert grammar 1 to CNF

$A \to BC$

$A \to a$

Grammar 1 to CNF.

$S \to wvS \mid wv$

D $S \to AS \mid wV$

a) $A \to wV$

3) $w \to w$

4) $V \to V$

D) Grammar 1 to GNF.

A → aα.

S → αVS | αV

1) S → αVS | αV

2) S → αVB

3) B → VS | ε

1) S → αVB

2) B → VS | ε

Q4) S → NPVP

NP → ADNO | DENO | DEADNO | NO

VP → VVNP

DE → the | in

AD → short | tall | green.

VV → lives

NO → girl | boy | house.

production.

S → AB

A → CD | ED | ECD | A

B → FA

E → a | b

C → c | d | e

F → f

D → g | h | i

D Terminal → {a, b, c, d, e, f, g, h, i}.

2) Non-terminal → {S, A, B, C, D, E, F}.

3) no the grammar cannot generate "The tall boy hides in the house."

4) $S \to AB$

$A \to CD \mid ED \mid E \mid D$

$B \to FA$

$E \to a \mid b$

$C \to c \mid d \mid e$

$F \to f$

$D \to g \mid h \mid i.$

5) $S \to q_1 q_2$

$q_1 \to q_3 q_4 \mid q_5 q_4 \mid q_5 \mid q_4$

$q_2 \to q_6 q_1$

$q_5 \to a \mid b$

$q_3 \to c \mid d \mid e$

$q_6 \to f$

$q_4 \to g \mid h \mid i.$