

→ How to find first() and follow()

800m given CFG.

① $\rightarrow abc | def | ghi$

2, first of any terminal = terminal

3, first of (ϵ) = ϵ

ex, what is the first of ϵ - given grammar.

① $\sim s \rightarrow abc | def | ghi$

so a, d, and g are the first.

a, b, and g are the first of this grammar.

Note:- capital letters we denote to variables
and small letters we denote to the terminals.

ex 8-

$\sim s \rightarrow ABC | ghi | jkl$

A $\rightarrow a | b | c$

B $\rightarrow b$

D $\rightarrow d$.

sol from each

D its first is d.

B its first is b

A its first a and b and c because they are small and they are terminals.

Now as derived capital A/B/C these letters are capital, means they are variables so we will find first of A which is A, b, c.

and other is g, then j.

write it standard -

Find the first of the following CFG.

Q) $S \rightarrow ABC \mid ghi \mid jkl, (a,b,c,g,j)$

A $\rightarrow a \mid b \mid c, a, b, c$

B $\rightarrow b, b$

C $\rightarrow d, d$

sol start from ① its first is then b

ex-2

$$\begin{array}{ll} S \rightarrow A B C & a, b \\ A \rightarrow a | b | \cancel{\epsilon} & a, b, \cancel{\epsilon} \\ B \rightarrow c | d | \cancel{\epsilon} & c, d, \cancel{\epsilon} \\ C \rightarrow e | f | \cancel{\epsilon} & e, f, \cancel{\epsilon} \end{array}$$

ex-3

$$\begin{array}{ll} E \rightarrow T E' & id, C \\ E' \rightarrow * T E' | \epsilon & *, \epsilon \\ T \rightarrow F T' & pd, C \\ T' \rightarrow \epsilon | + F T' & \epsilon, + \\ F \rightarrow id | \cancel{C} CE & id, C \end{array}$$

→ Notice if we start from the very beginning
then

E of first is T capital the T of first is F
capital and F of first is
id and open bracket C

then second is T and T of first is

E and +

then T of first is F and
F of first is id and (

Now Σ' of first is one is $*$ and other
is ϵ

Now E and first of E is T and
first of T is \cancel{pd}, C

Q2

$$\begin{array}{l} S \rightarrow A B C E, a, b, c, d, e, f, \underline{\epsilon} \\ A \rightarrow a/b \mid E, a, b, \underline{\epsilon} \\ B \rightarrow c/d \mid E, c, d, \underline{\epsilon} \\ C \rightarrow e/f \mid E, e, f, \underline{\epsilon} \end{array}$$

Start from those which you think its first is present clearly. which is E .

C

then find first of B . which is $c, d, \underline{\epsilon}$

then find first of A which is.

Now find first of S . which is A variable

and what is first of A ?? which is

a, b it also include $\underline{\epsilon}$ but dont write these in terminal, instead make the cross over A variable and instead of it write $\underline{\epsilon}$.

means we have done A .

Now put value of B . which is c and d and again make it cross over B and then write $\underline{\epsilon}$ on it.

Now look on capital C

Note:- in variable A End if there will not be $\underline{\epsilon}$ then we just stop there.

\Rightarrow Given CFB find the first and the follow
of the following.

ex)

$\sim S \rightarrow abc | def | ghi$, $a, b, c, d, e, f, g, h, i$

ex2 - $\sim S \rightarrow ABC | ghi | jkl$ ($a, b, c, g-j$)
 $A \rightarrow a | b | c$ a, b, c
 $B \rightarrow b$ b
 $D \rightarrow d$, d

ex3, $\sim S \rightarrow ABC$ a, b, c, d, e, f, E
 $A \rightarrow a | b | E$ a, b, E
 $B \rightarrow c | d | E$, c, d, E
 $C \rightarrow e | f | E$, e, f, E

ex4,

$E \rightarrow \underset{E}{\underset{\epsilon}{\epsilon}} T E$ $id, C, *$

$E' \rightarrow * T E' / E$, $*, E$

$T \rightarrow E / + F T'$, $E, +$

$F \rightarrow id / (C E)$, id, C

$T \rightarrow F T'$

\Rightarrow follow -

follow(A) contains set of all terminals present in right of 'A'

Rule) follow of start symbol is \$
 $f_0(A) = \{\$\}$

\rightarrow in the First() case we were focusing over the Left side but now in follow case we will focus over the Right side.

$$2, S \rightarrow ACD$$

$$C \rightarrow a/b \quad a, b$$

so for $f_0(A)$ mean follow of A which we will see in right side variable, which is C, if

in the A side of Right terminal then we will direct write terminal, but now in this case in A right there is an variable.

so in this case we will write first of that variable

means:

$$f_0(A) = \text{first}(C) = \{a, b\}$$

$$f_0(D) = \text{follow}(S) = \{\$\}$$

\hookrightarrow But there is Nothing in front of D, means there is ϵ ext. and we will say $f_0(D)$ is $\text{follow}(S)$ which is $\{\$\}$ dollar.

$\alpha_3 \rightsquigarrow a \underset{S}{\sim} b \mid b \leq a \leq \epsilon$ $\sqrt{S, b, a}$

Note:-

follow never contain ϵ