Lambda Calculus

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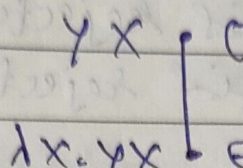
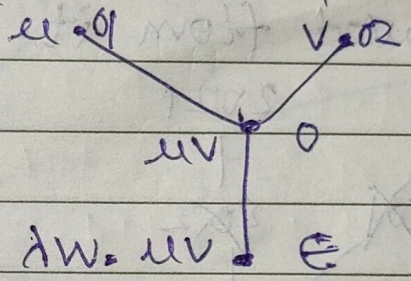
(1.) Given all the positions in construction tree of a term M, is it possible to convert it to the unique construction tree?

Solution ⇒ **No** ⇒ Unique tree can't be made



⇒ It can be λx.yx or λy.yx or λw.yx for some w.

- Be general possible:-



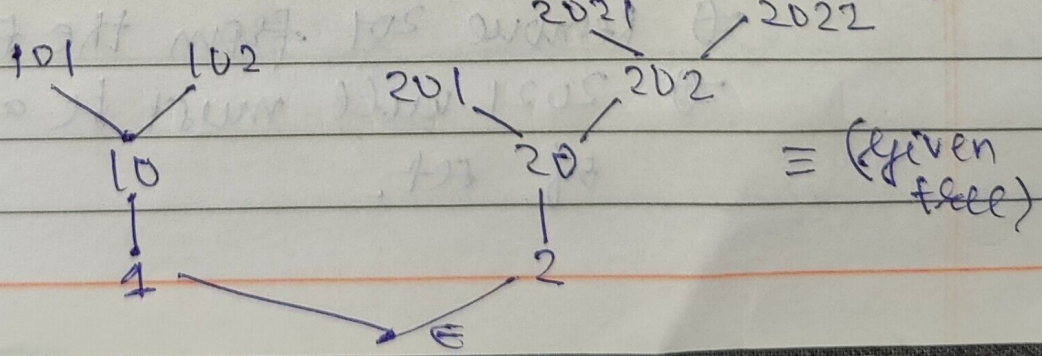
#W → general

- structure of the tree can be deduced.

(2.) Calculate minimum fixed set of position values from the given positions set so that tree can be constructed?

Solution:-

(a)



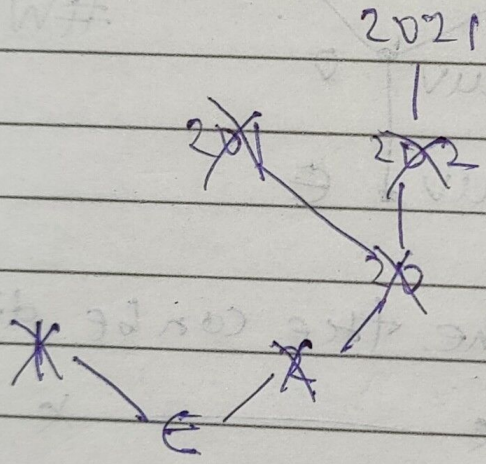
≡ (given tree)

Steps to follow :-

(a) Choose the leaves only. and if we have two pairs, always pick left one.

⇒ {101, 201, 2021} → leaves node
- 102 is rejected with 101
- 2022 is rejected with 2021

(b) Start constructing the tree from one of the leaf node, and cancel all of the nodes which can be deduced from it.



→ It is must to include 2021.

→ After including 2021, all {202, 20, 2, ϵ} can be inferred

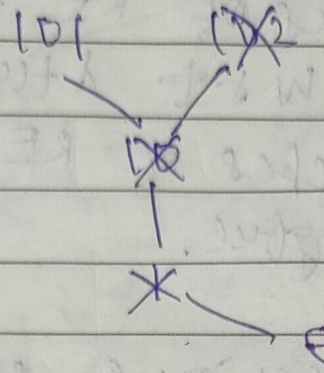
→ From 2, we know 1 will always exist

→ From 202, we know 201 will always exist

⇒ Remove 201 from the set

⇒ 2021 will must be a part of set.

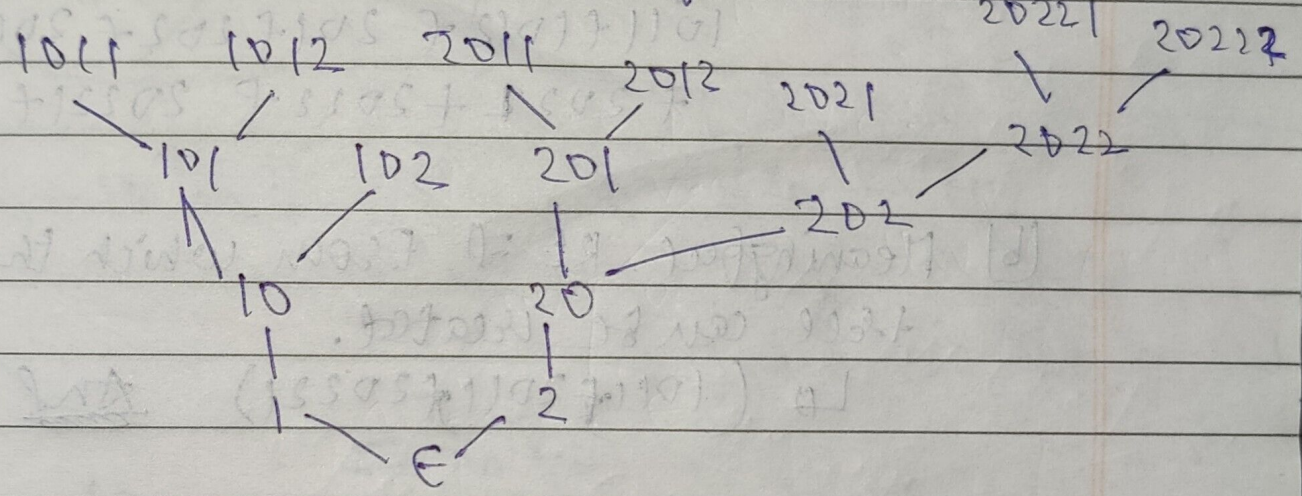
(c) Repeating for other remain under :-



101 have to be included

Φ {101, 2021} Ans

Example :- construct min fit for it :-



Solution :- Leaves are Φ {1011, 102, 2011, 2021, 20221}

- 102 can be inferred from 1011
- 2021 can be inferred from 20221.

Φ {1011, 2011, 20221} Ans.

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(3.) Let $\Sigma = \{0, 1, 2\}$,

(a) Give a RE, obtain the structure of it.

(b) Suggest types of RE that are meaningful w.r.t. them

(c) Suggest types of RE that are not meaningful.

Solution :-

(a) Consider the previous example:

$RE = (\in + 0 + 1 + 10 + 20 + 101 + 102 + 1011 + 1012 + 2011 + 2012 + 20221 + 20222)^*$

(b) Meaningful RE $\Rightarrow$ From which the whole tree can be created.

i.e. $(1011 + 2011 + 20221)$ Ans

(c) (Total - meaningful) Ans.