

Fall - 2014

doubt

Provide a context free grammar that gene -rates the following language over $\Sigma = \{0,1\}$: $\{\omega = 0*1*: |\omega| \text{ is odd}\}$

L= { @ \ , 0, 1, 011, 010, ---- }

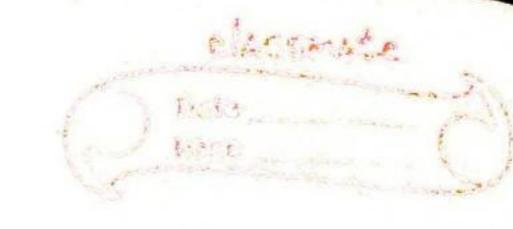
S -> AOB / AIB A -> E | AOO B -> E | B | I

2. A clique

Since, clique is Np problem and every NP problem is easy to verify in polynomial time.

Mete. given 3 clique is a decidable problem means in fact problem Statement is that a given graph Grévier?

we determine whether given gruph 13 3 clique or not in polynomial time. we can do sign any algorithm for delection of 3 dique like that 3 clique (verrex V, cages E). 1) if gruph has not 3 vertex thon it's if (vertex. Size() 1 = 3) return false 1/ if there are only 1 to 2, 2 to 3 and 3 to 1 odges then true. if (edge8. size() 1 = 3) return filse. if (!edges 1 to 2 or ! edges 2 to 3 or !edges 1 to 3) return fulse return true just like any alyonithm we can detect



in polynomial time whether given graph is a clique or not 80 given problem 18 decidable in fact every NP problem 18 decidable and clique is NP problem.

3. Answer the following.

a pofine the class NP-

- -> The NP in NP class stands for NONdeterministic palynomial time. It is the collection of decision problems that can be solved by a non-deterministic machine in polynomial time. Features:
 - 1) The Solutions-of the NP class are hard to find since they are being solved by a non-deterministic machine but the solutions are easy to verify.
 - 2) Phoblems of NP can be verified by a Turing machine in a polynomial time.

- b) Show that the class NP is closed under Concatenation-
- > Let A and B be languages that are decided by NP-machines TA and To

Now we want to 8how that, there is a non-deterministic poly time decider TAUB that decides concatenation of A and B.

The construction of TADD is as follows:

TATOB = "ON input 8:

- 1) Split Sinto S1, S2 Such that S=S1S2.
- 2) Run the NP machine TA on S1. If TA is rejected, then reject.
- 3) Else run TB on S2. If TB is rejected, then reject
- 4) Else accept.

The time tuhen by Step 1 is orn) in a 2 toppe tupe Turing Machine. Thus, T is a poly-time non deterministic decider for A 0 B

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Thus, it is proved that NP is closed under concatenation.