Problem

Show that NP is closed under the star operation.

Step-by-step solution

Step 1 of 1

Class- *P* : *P* is a class of languages that are decidable in polynomial time on a deterministic single – tape Turing machine.

Now we have to prove that *NP* is closed under star operation.

• Let *L* be the language that decided by *NP* – machine

• Now we will construct a non deterministic Turing machine *NTIM N* to decide L^* in nondeterministic polynomial time

• Construction of *N* is as follows:

$N =$ "On input *w*:

1. If $w = \in$ then accept.

2. Non-deterministically slipt *w* into *k* pieces $w = w_1 w_2 ... w_k$

3. For each w_i, non-deterministically guess the certificates that show $w_i \in L$

4. Verify all certificates

(a) If verification is done then accept.

(b) else if verification is fails, then reject."

Thus we constructed a *NTM N* that decides L^* in nondeterministic polynomial time.

Hence *NP* is closed under star operation.

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