Problem

Call a regular expression ***star-free*** if it does not contain any star operations. Then, let $EQ_{\text{SF}-\text{REX}}$ = { $\langle R, S \rangle$ | R and S are equivalent star-free regular expressions}. Show that $EQ_{\text{SF}-\text{REX}}$ is in coNP. Why does your argument fail for general regular expressions?

Step-by-step solution

Step 1 of 2

Here in the given definition of language $\overline{EQ_{SF\_RFX}}$ any string s belongs to this iff it is of the following given form:

- Both of them from R and S are star free.

$s \in < R, S >$, R and S having both star free and $L(R) \neq L(S)$.

- s do not represent any of two regular expression encoding.

- One of them from R and S is not star free or both are not star free.

$s \in < R, S >$, either R or S are not star free or non of them are star free.

Comment

Step 2 of 2

If s do not represent any of two regular expression encoding or s is of the form $< R, S >$ where either one is not star free or both are not star free then the string is easily accepted in DTM (Deterministic Turing Machine) in the polynomial time.

If first condition follows that is R and S are star free then there must be some string u which is polynomial of size $|R| + |S|$. Hence there will be a NTM (Non Deterministic Turing Machine) which find string u in polynomial time, but it will not able to find string u where $L(R) = L(S)$.

Therefore, for general regular expression, argument fails. NTM recognizes $\overline{EQ_{SF\_RFX}}$ in some polynomial time, Hence it prove the case.

Comment