Problem

For each n, exhibit two regular expressions, R and S, of length poly(n), where L(R) ≠ L(S), but where the first string on which they differ is exponentially long. In other words, L(R) and L(S) must be different, yet agree on all strings of length up to $2^{\epsilon n}$ > 0.

Step-by-step solution

Step 1 of 2

Consider that two regular expressions, S and R, of length $poly(n)$ can be exhibited for every n,where $L(R) \neq L(S)$but the first string on which they differ in exponentially long.

• Now, consider the expression the expression which is given below:

$$\underbrace{(11...1)^*}_{p\,\text{times}}\underbrace{11?1?...1?}_{p-2\,\text{times}}$$

The above expression identify 1^k for each k which is not a multiple of p .

Comment

Step 2 of 2

Now, **a polynomial-length** can be constructed in such a way that recognize 1^k for each k and except those expression which are multiple of every first n prime.

• The nth prime is less than $n(\ln n + \ln\ln n)$foe every n ≥6. Therefore, the addition of the first $n$primes is $O(n^2 \log n)$.

• It is because the first number which is not a multiple of any of the first prime number is of the order $O(n^2 \log n)$, that cause to stop it in growing exponentially with n.

Hence form the above explanation, it can be said that "**every string of the length up to $2^{\varepsilon n}$, for a constant $\varepsilon > 0$, will be agreed for two regular expression $S$and R, where $L(R)$and $L(S)$must be different".**

Comment