获得的答案 返回

Let $G=(V,\Sigma,R,S)$ be the grammar. $V=\{S,T,U\}$; $\Sigma=\{0,\#\}$. R is the set of rules.

$$S \to TT \mid U$$
$$T \to 0T \mid T0 \mid \#$$
$$U \to 0U00 \mid \#$$

Description of $L(G)$ in English is given as

$L(G)$ is the set of all strings containing 0's and $\#$'s of the form(s)

(a) Strings containing exactly two $\#$'s and any number of 0's.

(b) Strings containing exactly one $\#$ and the number of 0's on the left of $\#$ are half the number of 0's to the right.

To prove the language $L(G)$ is not regular, consider by contradiction $L(G)$ is regular.

Let $A=L(G)\cap 0^*\#0^*$.

From our consideration $L(G)$ is regular. So A is regular.

Since A is regular, using pumping lemma let p be the pumping length of the regular language.

Consider the sting $w=0^p\#0^{2p}$.

Clearly length of the string $w\in A$ is greater the p. That is $|w|>p$.

So, by pumping lemma we have $w=xyz$ such that

$|xy|\le p$, $y\ne\varepsilon$ and $xy^iz\in L(G)$ for all $i\ge 0$.

Since A is a regular language, consider the possible ways of cutting the string w.

• If x contains the character $\#$, then y will be on the right side of $\#$. Pumping y down, increases the number of 0's on the left such that number of 0's on the left of $\#$ are not equal to half the number of 0's to the right.

• If y contains the character $\#$, then pumping y down, increases the number of $\#$'s in the string.

• If z contains the character $\#$, then y will be on the left side of $\#$. Pumping y down, decreases the number of 0's on the right such that number of 0's on the left of $\#$ are not equal to half the number of 0's to the right.

The resulting string of all the above cases does not belong to A. So, we can say that A does not satisfy pumping lemma. Hence A is not a regular language.

This is a contradiction to our statement that $L(G)$ regular language.

Therefore, $L(G)$ is not a regular language.