CS & IT ENGINEERING

Theory of Computation

Regular Languages &
Non Regular Languages

DPP 04 Discussion Notes

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01 Question

02 Discussion

Q.1

Consider alphabet $\Sigma = \{a, b\}$, the empty string $\in$ and the set of strings S, P, Q and R generated by the corresponding non-terminals of a regular grammar. S, P, Q and R related as follows (S is a start symbol): **[MCQ]**

$$S \rightarrow aP \mid bQ \mid \in$$
$$P \rightarrow bR \mid aS$$
$$Q \rightarrow aR \mid bS$$
$$R \rightarrow aQ \mid bP$$

S
aP
abR
abaQ
ababS

ε, aa, bb

A. $L = \{w : n_a(w) \text{ and } n_b(w) \text{ both are even}\}$.

B. ~~$L = \{w : n_a(w) \text{ and } n_b(w) \text{ both are odd}\}$.~~

C. ~~$L = \{w : n_a(w) \text{ or } n_b(w) \text{ are even}\}$.~~

D. None of these.

Q.2

Consider the following language L on alphabet

$\Sigma = \{a, b\}$

$L = \{wxw^R \mid w, x \in \{a, b\}^+\}$ = axa + bxb = a(a+b)$^+$a + b(a+b)$^+$b

[MSQ]

The correct regular grammar of above language is/are possible?

A.

$S \rightarrow aAa \mid bAb$

$A \rightarrow aA \mid bA \mid a \mid b$

$B \rightarrow aA \mid bA \mid a \mid b$

B.

$S \rightarrow aAa \mid bAb \mid \in$

$A \rightarrow ab$

C.

$S \rightarrow aA \mid bB$

$A \rightarrow aA \mid bA \mid a$

$B \rightarrow bB \mid aB \mid b$

D.

$S \rightarrow Aa \mid Bb$

$A \rightarrow Aa \mid Ab \mid a$

$B \rightarrow Bb \mid Ba \mid b$

Q.3

Consider the following statements:

S_1: If language is regular then, grammar must be regular.

S_2: If grammar is regular then, language can't be regular.

[MCQ]

Which of the following is correct?

A. S_1 is true.

B. S_2 is true.

C. Both S_1 and S_2 are true.

D. None of these

Q.4

[MCQ]

Consider the following grammar G:

G:

$S \rightarrow A\,B\,C$

$A \rightarrow aA \mid a \longrightarrow a^+$

$B \rightarrow bc \longrightarrow bc$

$C \rightarrow cC \mid \in \longrightarrow c^*$

$L = a^+bcc^* = a^+bc^+$

The language generated by above grammar is?

A. $L = \{a^*bcc^*\}$

B. $L = \{a^+bc^+\}$ ✓

C. $L = \{a^*bc^*\}$

D. None of these

Q.5

For language L = {b a*b} the minimum pumping length will be ___.

[NAT]

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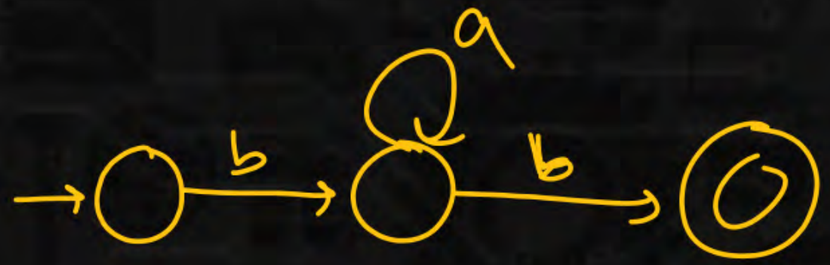


Q.6

[NAT]

Consider some regular expression:

r_1: $a^*bb^*c^*(ab)^*$

r_2: $a^*b^*ab \cup (bb)^*$

If minimum pumping length of r_1 is P_1 and minimum pumping of r_2 is P_2 then the value of $P_1 * P_2$ will be 6.

Q.7

Suppose, a language L has finite automata M with N states. The language generated by FA is L(M) is an infinite if and only if $\exists_w \in L$ such that

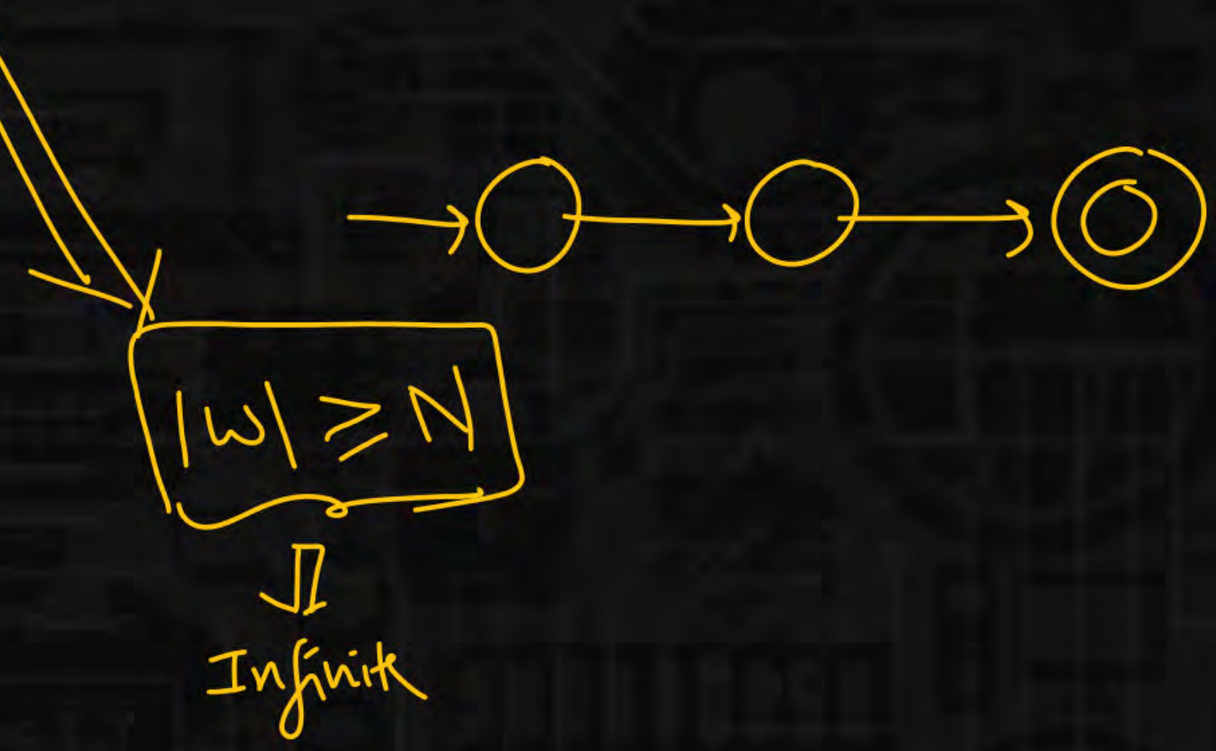
[MCQ]

A. $N \geq |w| \leq 2N$

B. $N \leq |w| \leq 2N-1$

C. $N \leq |w| \geq 2N-1$

D. None of these



Q.8

[MCQ]

Consider the following grammars G_1 and G_2:

G_1: $S \rightarrow aS \mid S \mid A$

$A \rightarrow aA \mid abA \mid \in$

RLG

G_2: $S \rightarrow aS \mid a$

RLG

Which of the following grammar is/are regular?

A. G_1 only

B. G_2 only

C. Both G_1 only G_2 ✓

D. None of these


THANK YOU GW
SOLDIERS !