CS & IT ENGINEERING

Regular Languages & Non Regular Languages

Theory of Computation

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Q.1 Which of the following language is/are regular? [MSQ]

$m == n$

A. $L = \{a^m b^n \mid m \not< n \text{ and } m \not> n\}$

B. $L = \{a^n b^n c^n \mid n \geq 100\}$

finik combination

C. $L = \{a^m b^n \mid LCM(m, n) = 100\}$

D. $L = \{aaa^n b^n bb \mid n \geq 1\}$

Q.2 Consider the following two language L_1 and L_2. [MCQ]

$$L_1 = \{www \mid w \in \{a\}^*\} = \{\varepsilon, a^3, a^6, a^9, \ldots\} = (aaa)^* = a^{3n}$$

$$L_2 = \{\{a^{n^n}\} * \mid n \geq 1\} = a^*$$

Which of the following is correct?

A. only L_1 is regular.

B. only L_2 is regular.

C. Both L_1 and L_2 are regular.

D. None of these.

Q.3 Which of the following language is $\overbrace{\text{non-regular?}}$ [MCQ] (PW)

A. $L = \{wxw^R \mid x, w \in \{a, b\}^*\}. \longrightarrow reg$

B. $L = \{wxw \mid w, x \in \{a, b\}^*\}. \longrightarrow reg$

C. $L = \{\underbrace{wxwx}_{y\ \ y} \mid w, x \in \{a, b\}^+\}. \longrightarrow non\ reg$

D. None of these

Consider the following grammar G_1 and G_2:

$G_1: S \to aAb$

$\quad A \to aB \mid \epsilon$ ⟹ $A \to aAb \mid \epsilon$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad (a^n b^n)$

$\quad B \to Ab$

$G_2: S \to a\underline{A}\underline{B}b$

$\quad A \to aA \mid \epsilon$ ⟹ a^*

$\quad B \to bB \mid \epsilon$ ⟹ b^*

a_b^+

Which of the following grammar generates a regular language?

A. G_1 only

B. G_2 only

C. Both G_1 and G_2

D. None of these

Q.5 Consider the following three languages: [NAT] (PW)

(1) $L = \{a^{n^n} \mid n \geq 1\}$ ✗

(2) $L = \{a^{m^n} \mid m = n^2, n \geq 1\} = \{a, a^{\chi}, \cdot a^{q^3}, \cdots \}$

(3) $L = \{a^{m^n} \mid n \geq 1, m > n\}$

Total number of regular languages is/are____1____.

$$a^{m^1} \rightarrow a^{2}, a^{3}, a^{4}, \cdots$$

Q.6 Consider the following grammar

[MCQ]

G:

$$G = S \rightarrow AB \mid CD$$

$$A \rightarrow aaA \mid \epsilon \quad \rightarrow (aa)^*$$

$$B \rightarrow bB \mid \epsilon \quad \rightarrow b^*$$

$$C \rightarrow aaC \mid \epsilon \quad \rightarrow (aa)^*$$

$$D \rightarrow bD \mid \epsilon \quad \rightarrow b^*$$

$$(aa)^* b^* + (aa)^* b^*$$

The language generated by above grammar is:

- **A.** Finite ✗
- **B.** Infinite but regular
- **C.** Non-regular ✗
- **D.** None of these

Which of the following language is non-regular?   [MCQ]

A. $L = \{a^{2m} \, \underline{b}^n \, \underline{b}^n \mid m, n \geq 1\}$ $= \{a^{2m} \, b^{2n} \mid m, n \geq 1\} \longrightarrow reg$

B. $L = \{a^m \, b^n \, X \mid m, n \geq 1, X \in \{a,b\}^*\}$ $= a^+ b^+ (a+b)^* \longrightarrow reg$

C. $L = \{\{a^{n^2}\}^* \mid n \geq 0\}$ $= a^* \longrightarrow reg$

D. None of these

THANK YOU GW SOLDIERS !