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Roll#: 21L-5448

Section: 6C

## Assignment 1

Q1

a)

	Finite/Infinite
• L <sub>1</sub>	Infinite
• L <sub>2</sub>	finite
• L <sub>3</sub>	Infinite
• L <sub>4</sub>	Infinite
• L <sub>5</sub>	finite
• L <sub>6</sub>	finite
• L <sub>7</sub>	finite
• L <sub>8</sub>	finite

- b)
- L<sub>2</sub> : { aabb, bbaa, abab, baba, abba, baab }
  - L<sub>5</sub> : {  $\epsilon$ , a, b, aa, ab, ba, bb }
  - L<sub>6</sub> : { a, b }
  - L<sub>7</sub> : { aa, ab, aba, bb }
  - L<sub>8</sub> : { aaa, bb }

- c)
- $L_7 L_8 : \{ aaaaaa, aabb, abaaa, abbb, abaaaa, ababb, bbaaa, bbbb \}$
  - $L_6 L_8 : \{ aaaa, abb, baaa, bbb \}$
  - $L_5 L_8 : \{ aaa, bb, aaaa, abb, baaa, bbb, aaaaa, aabb, abaaa, abbb, baaaa, babb, bbaaa, bbbb \}$

- d)
- $L_8^0 = \{ \}$
  - $L_8^1 : \{ bb, ~~aaa~~ \}$
  - $L_8^2 : \{ ~~aaaaaa~~, aabbb, bbaaa, bbbb \}$

- e)
- $L_7 \cap L_8 : \{ bb \}$
  - $L_6 \cap L_8 : \{ \}$
  - $L_5 \cap L_8 : \{ bb \}$
  - $L_1 \cap L_2 : \{ aabbb, bbaa, abab, babb, abba, baab \}$
  - $L_3 \cap L_4 : \{ \}$

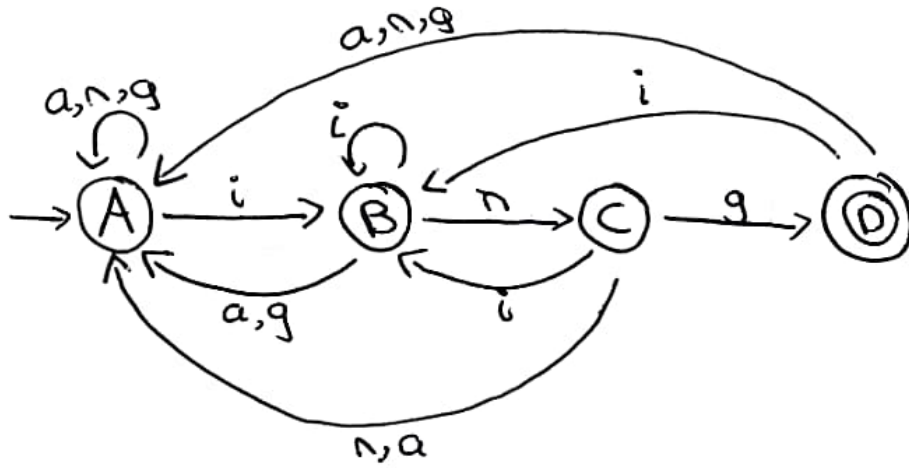
- f)
- $L_1 : \{ x \mid n_a(x) \text{ is odd} \}$
  - $L_2 : \{ x \mid n_a(x) \neq 2 \text{ or } n_b(x) \neq 2 \}$
  - $L_3 : \{ x \mid n_a(x) \neq 0 \text{ or } n_b(x) \text{ is even} \}$

- g)
- $L_7 \cup L_8 : \{aa, ab, aba, bb, aqa\}$
  - $L_6 \cup L_8 : \{a, b, aqa, bb\}$
  - $L_5 \cup L_8 : \{\epsilon, a, b, aa, ab, ba, bb, aqa\}$
  - $L_1 \cup L_2 : \text{Set } L_2 + \text{all the strings that contain even number of a's}$
  - $L_3 \cup L_4 : \text{All the strings present in } L_3 \text{ and } L_4, \text{ no repetition.}$

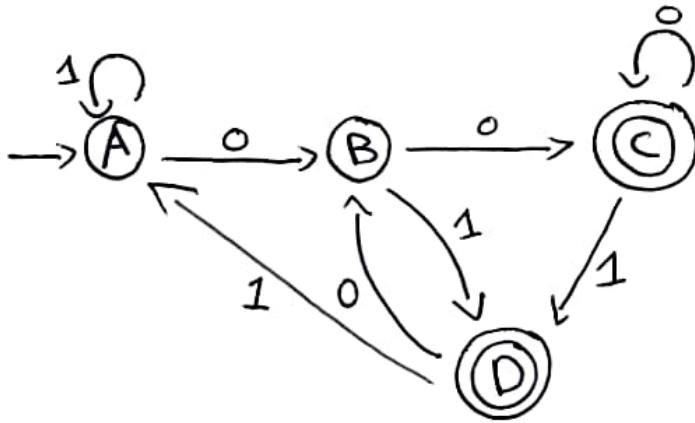
- h)
- $L_7 - L_8 : \{aa, ab, aba\}$
  - $L_6 - L_8 : \{a, b\}$
  - $L_4 - L_5 : \text{All strings with odd number of a's except for 'a', 'ab' and 'ba' (these strings belong to } L_5).$
  - $L_1 - L_3 : \text{All strings present in } L_1 \text{ set only}$

Q2

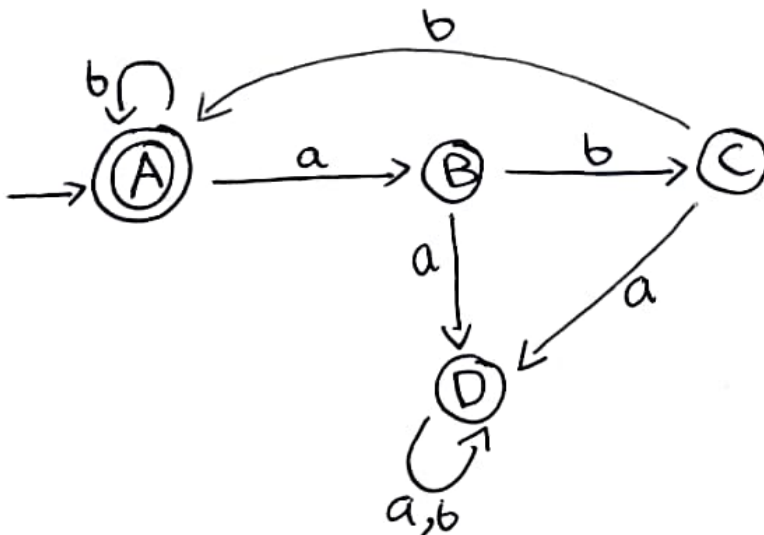
a)



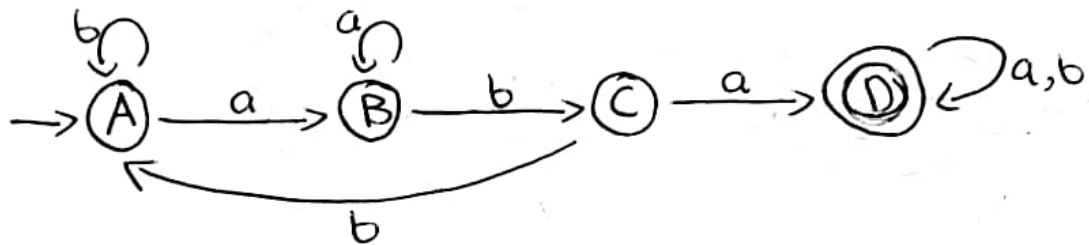
b)



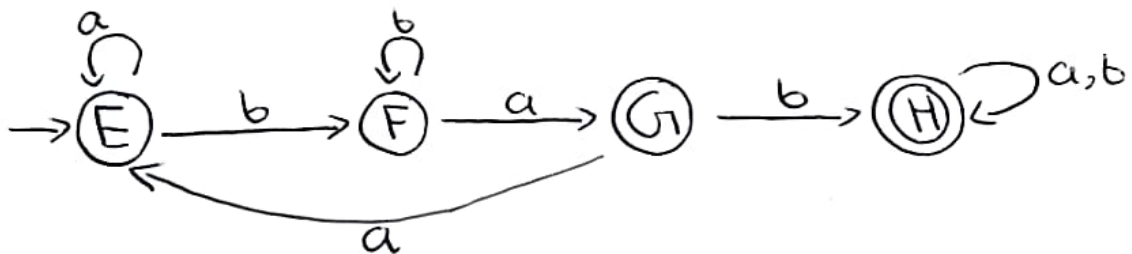
c)



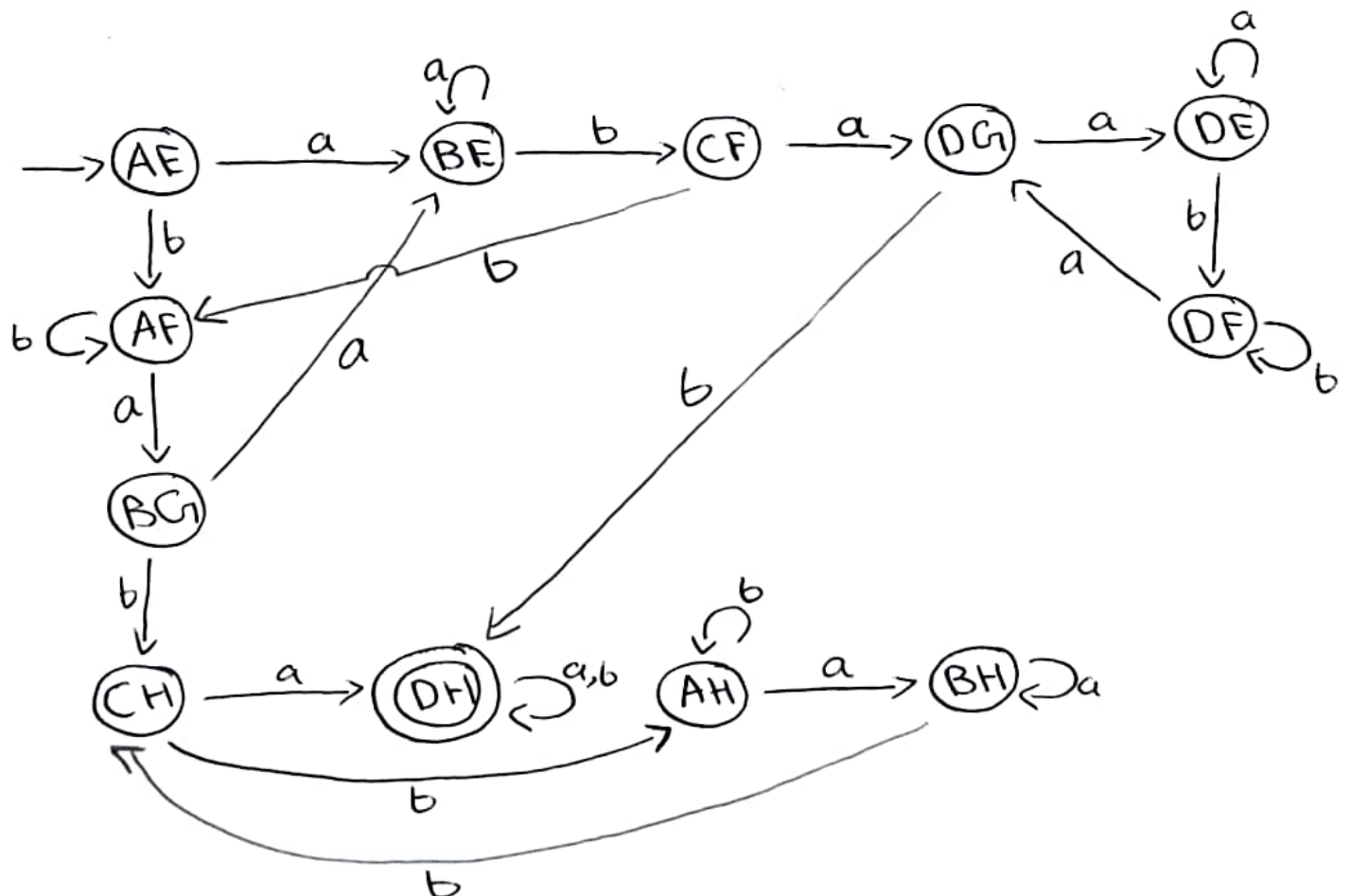
d) • M1: 'aba' as substring



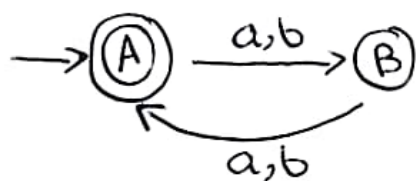
- Ma: 'bab' as substring



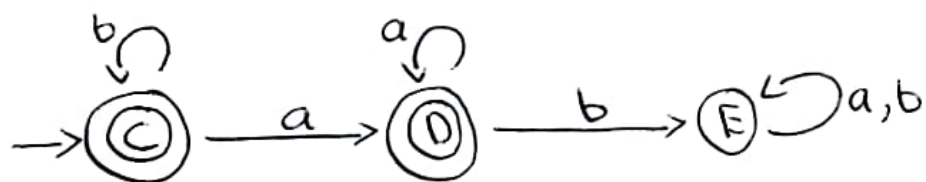
\*  $M_1 \cap M_2$  : 'aba' and 'bab' as a substring (Ans)



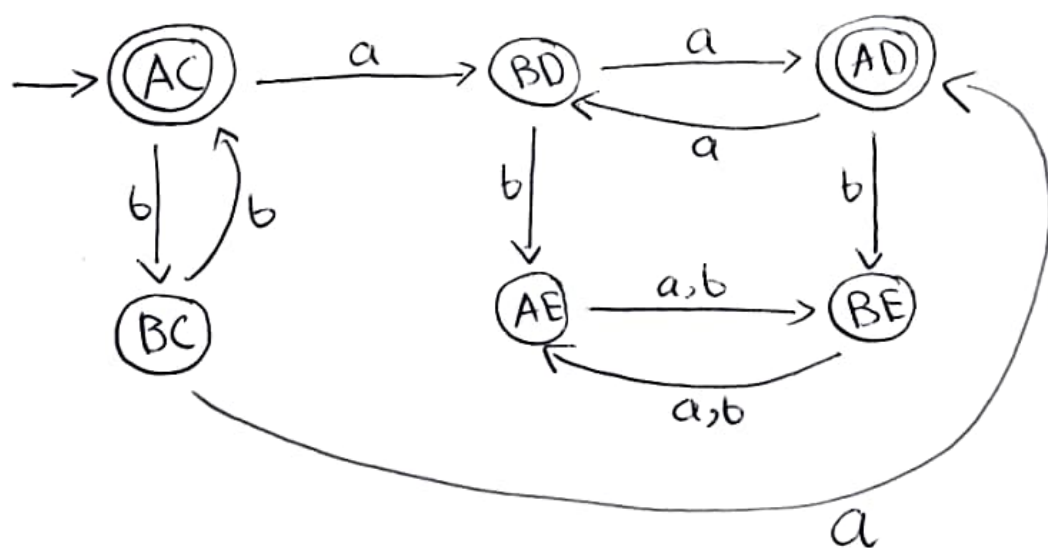
e) M1: Even length



M2: Does not contain 'ab' as substring



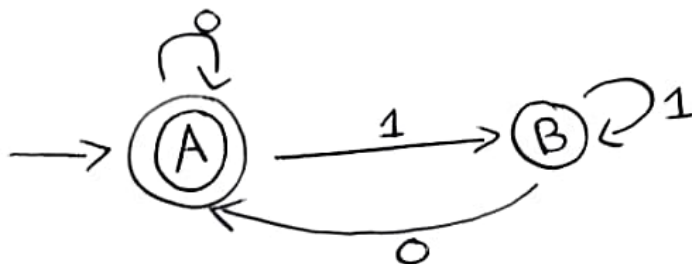
\*  $M_1 \cap M_2$ : Even Length but does not contain 'ab' as substring  
(Ans)



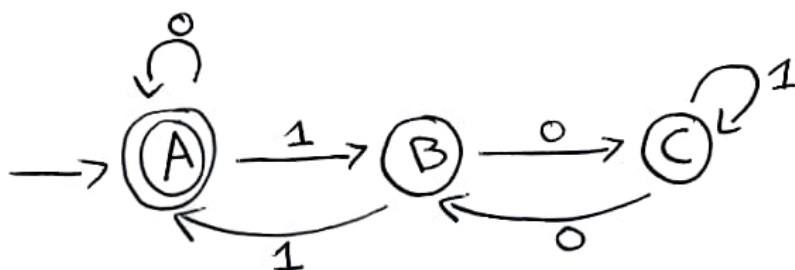
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graph LR
    Start(( )) --> A(((A)))
    A -- "a, b, c" --> B((B))
    B -- "a, b, c" --> C((C))
    C -- "a, b, c" --> A
  
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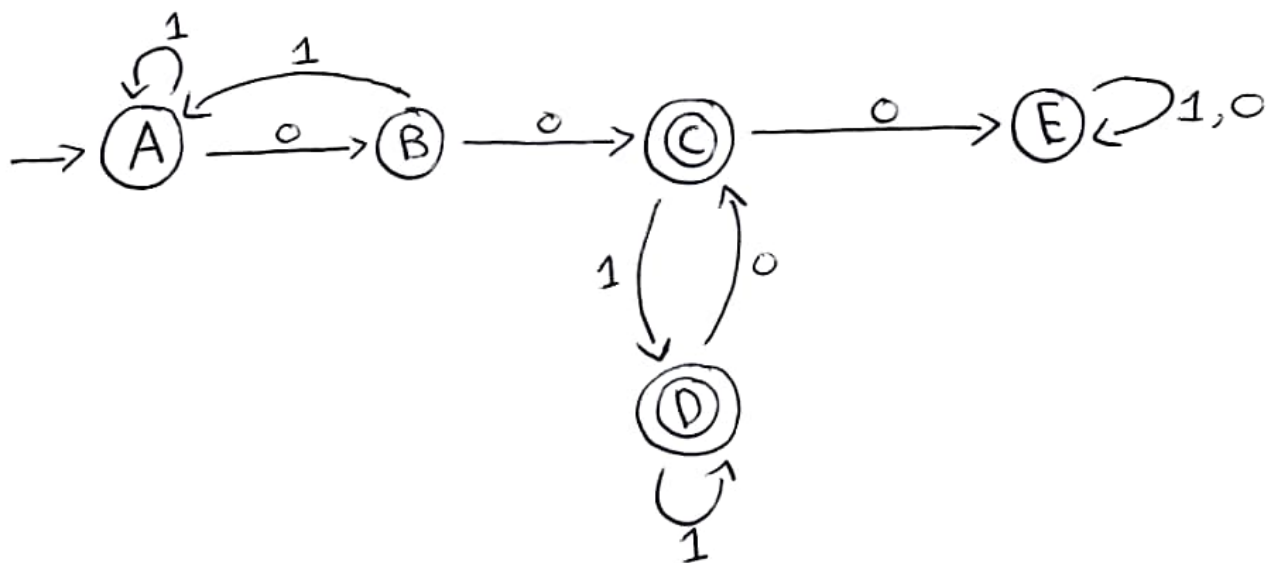
h)



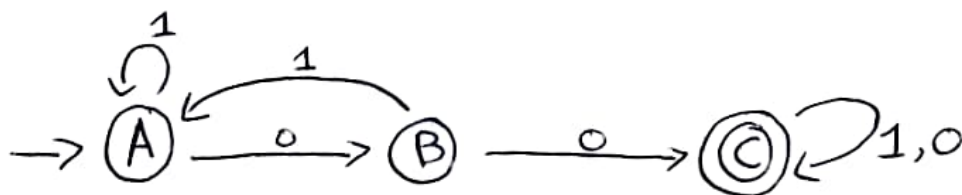
i)



j)



k)





b)

