

Revision for Automata session

Course: Mathematical Modeling

Duration: 60 minutes

Exam Code: **1712**

Open book.

Choose the best answer for each multiple-choice question and fill in the blank needed.

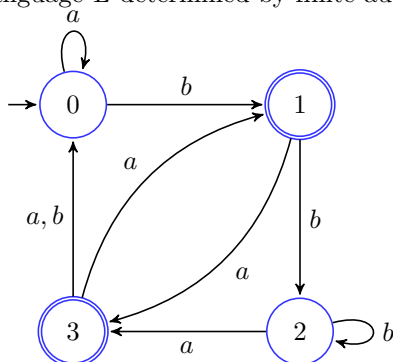
Câu 1. Let's consider $\Sigma = \{a, b, c\}$ and $L = \{a, abb, bba, ba, c\}$. Which string belongs to L^* ?

- (A) *abaaacbb* (B) *aaabbbbba* (C) *aabacabba* (D) *babacbbbaaa*

Câu 2. Let's consider $\Sigma = \{a, b, c\}$ and $L = \{a, aab, bbc, ba\}$. Which string does not belong to L^4 ?

- (A) *aababbc* (B) *baaaaaab* (C) *abaaabba* (D) *abbcaab*

Questions from 3–9, consider the language L determined by finite automata on $\{a, b\}$ as follows.



Câu 3. Choose the correct statement.

- (A) This automata is a NFA since it is not deterministic.
(B) This automata is not a DFA since the number of states is not finite.
(C) This automata is not optimized.
(D) Any language L could be represented by this automata.

Câu 4. Which string is valid?

- (A) *aabb* (B) *aababbab* (C) *aabba* (D) *abbbbab*

Câu 5. Which string is not valid?

- (A) *ababab* (B) *aabbbaabbab* (C) *aabbbbbaaa* (D) *bbbbbababa*

Câu 6. Which string is not in L^2 ?

- (A) *aababbab* (B) *aabba* (C) *aabbbbbaaa* (D) *abbbb*

Câu 7. Which regular expression Z corresponds to the considering finite automata?

- (A) $X = a^*b$; $Y = X(a + bb^*a)$; $Z = X(Y(a + b)X)^*$
(B) $X = a^*b + Ya$; $Y = X(a + bb^*a)$; $Z = (XY(a + b))^*(X + XY)$
(C) $X = a^*b + (a + bb^*a)a$; $Y = X(a + bb^*a)$; $Z = (XY(a + b))^*(X + XY)$
(D) $X = a^*b + a^*b(a + bb^*a)a$; $Y = (a + bb^*a)$; $Z = X(Y(a + b)X)^* + XY((a + b)XY)^*$

Câu 8. When using determinisation algorithm to convert NFA into DFA, how many states are there in the new DFA?

- (A) 6 (B) 7
(C) 10 (D) None of the others.

Câu 9. How many states are there in the minimized/optimized DFA (which is equivalent to the above NFA)?

- (A) 6 (B) 7
(C) 10 (D) None of the others.

Câu 10. Find the correct statement.

- (A) When occurring an event from a state, the NFA does not determine the next state.
- (B) NFA has not finite number of states but DFA has a finite number of states .
- (C) The number of states is always reduced when determinisation from NFA to DFA.
- (D) NFA does not determine surely the next state in order to simplify the graph.

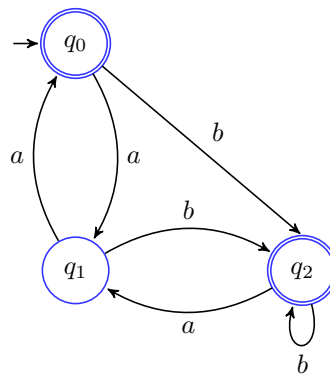
Câu 11. Are two regular expressions $E_1 = (a + b)^*$ and $E_2 = (aa + ab + ba + bb)^*$ are equivalent? If not, give a counter-example.

- (A) They present the same language
- (B) $E_1 \subseteq E_2$
- (C) They are not equivalent, the counter-example is _____ .

Câu 12. Do two regular expression $E_3 = ((a + b)^*(ac)^*)^*$ and $E_4 = (a + aa + ba + b + c)^*$ present the same language? If not, give a counter-example.

- (A) They present the same language
- (B) $E_3 \subseteq E_4$
- (C) They are not equivalent, the counter-example is _____ .

Câu 13. Do the following automata and regular expression $E = ((aa)^* + bb^*a(aa)^*b(ab)^*)^*$ present the same language? If not, give a counter-example.



- (A) They present the same language.
- (B) They are not equivalent, the counter-example is _____ .