

1. Which of the following statements is true regarding deterministic finite automata (DFA) and nondeterministic finite automata (NFA)?

- A) DFA can have multiple transitions for a single input symbol from a given state.
 - B) NFA can have epsilon (null) transitions, whereas DFA cannot.
 - C) DFA and NFA have different computational power.
 - D) Every NFA cannot be converted to a DFA.
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2. In which of the following cases is a string considered acceptable by a finite automaton?

- A) If the string starts with an alphabet and ends with a number.
 - B) If there exists a transition sequence leading to a final state.
 - C) If the automaton halts after reading the input string.
 - D) If the input string contains an even number of symbols.
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3. Which of the following properties does not belong to transition functions of finite automata?

- A) Totality
 - B) Determinism
 - C) Surjectivity
 - D) Epsilon-moves
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4. What is the primary difference between Mealy and Moore machines?

- A) Mealy machines have outputs that depend only on the state, while Moore machines depend on the current input.
 - B) Moore machines have outputs that depend only on the state, while Mealy machines depend on the current input.
 - C) Mealy machines produce output after the transition is completed.
 - D) Moore machines produce output only at the start of the transition.
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5. Which of the following statements about the minimization of finite automata is correct?

- A) The minimized DFA can contain more states than the original DFA.
- B) The minimized DFA has the same computational power as the original DFA.
- C) The minimization process always removes all unreachable states.
- D) The minimized DFA may accept a different language than the original.

6. Which algebraic method is used to find the equivalence of regular expressions and finite automata?

- A) Turing's Theorem
- B) Pumping Lemma
- C) Arden's Theorem
- D) Kleene's Theorem

7. The Pumping Lemma is used to prove which of the following properties of a language?

- A) The language is context-free.
- B) The language is finite.
- C) The language is regular.
- D) The language is recursively enumerable.

8. Which of the following is true about the closure properties of regular sets?

- A) Regular sets are closed under union, intersection, and complement.
- B) Regular sets are not closed under intersection but are closed under complement.
- C) Regular sets are not closed under complement but are closed under concatenation.
- D) Regular sets are closed under intersection and concatenation but not under union.

9. What is the role of null (epsilon) moves in non-deterministic finite automata (NFA)?

- A) They are used to increase the number of transitions.
- B) They allow transitions without consuming any input symbol.
- C) They reduce the size of the transition table.
- D) They allow the automaton to reject a string without processing it.

10. According to Myhill-Nerode Theorem, which of the following is not true?

- A) It helps in the minimization of DFAs.
- B) It can determine whether two strings belong to different equivalence classes.
- C) It can be used to prove the regularity of languages.
- D) It applies to context-free grammars.

11. Which of the following is an example of a recursive language?

- A) A language accepted by a Turing machine with an infinite tape.
- B) A language for which there exists a DFA.
- C) A language for which a decision procedure exists.
- D) A language that can be enumerated by a finite automaton.

12. Chomsky's hierarchy classifies languages into how many distinct types?

- A) 2
- B) 3
- C) 4
- D) 5

13. In converting a regular grammar to a regular expression, which of the following is true?

- A) Only right-linear grammars can be converted to regular expressions.
- B) Both left-linear and right-linear grammars can be converted to regular expressions.
- C) Only left-linear grammars can be converted to regular expressions.
- D) Regular grammars cannot be converted to regular expressions.

14. What is the significance of left-linear and right-linear grammars in formal languages?

- A) They define context-sensitive languages.
- B) They define regular languages.
- C) They define context-free languages.
- D) They define recursively enumerable languages.

15. Which type of automaton is used to represent regular grammars?

- A) Pushdown Automaton
 - B) Linear Bounded Automaton
 - C) Deterministic Finite Automaton
 - D) Non-deterministic Turing Machine
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16. Which of the following correctly defines a finite automaton?

- A) A machine that accepts context-free languages.
 - B) A machine that uses an infinite number of states to recognize input strings.
 - C) A machine with a finite number of states used to recognize regular languages.
 - D) A machine that processes recursive languages.
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17. Which of the following is not true about the equivalence of DFA and NFA?

- A) For every NFA, there exists a DFA that recognizes the same language.
 - B) An NFA can have epsilon transitions, while a DFA cannot.
 - C) DFA and NFA have different expressive power.
 - D) DFA and NFA can recognize the same class of regular languages.
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18. In a transition graph, which of the following is true?

- A) Each transition is labeled with a sequence of inputs.
 - B) The initial state must be a final state.
 - C) Epsilon transitions allow state changes without consuming input.
 - D) A transition graph can only represent deterministic finite automata.
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19. What is the role of the Pumping Lemma in regular languages?

- A) It is used to minimize the number of states in a DFA.
 - B) It is used to prove that a language is regular.
 - C) It is used to prove that a language is not regular.
 - D) It is used to find the regular expression for a language.
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20. Which of the following operations is not a closure property of regular languages?

- A) Union
 - B) Intersection
 - C) Complement
 - D) Exponentiation
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21. Which of the following is correct about the conversion of an NDFA with null moves to a DFA?

- A) The resulting DFA always has fewer states than the original NDFA.
 - B) The resulting DFA has exactly the same number of states as the NDFA.
 - C) The conversion process involves removing null moves and creating equivalent transitions.
 - D) It is impossible to convert an NDFA with null moves into a DFA.
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22. Arden's Theorem is primarily used in which of the following contexts?

- A) Proving the equivalence of two finite automata.
 - B) Constructing a regular expression from a finite automaton.
 - C) Proving the minimization of a DFA.
 - D) Defining the closure properties of regular sets.
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23. Which of the following best describes the Myhill-Nerode Theorem?

- A) It defines the number of equivalence classes for context-free languages.
 - B) It helps in constructing the most minimal DFA.
 - C) It provides a method to prove whether a language is recursively enumerable.
 - D) It applies to context-sensitive grammars.
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24. Which of the following properties of a regular language can be proved using the Pumping Lemma?

- A) The language is context-free.
 - B) The language is recursive.
 - C) The language can be represented by a DFA.
 - D) The language is not regular.
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25. Which of the following is an example of a right-linear grammar?

- A) $A \rightarrow aB$
 - B) $A \rightarrow Ba$
 - C) $A \rightarrow a$
 - D) $A \rightarrow aB \mid bA$
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26. In Chomsky's hierarchy, which class of languages can be recognized by a finite automaton?

- A) Type-0 languages
 - B) Type-1 languages
 - C) Type-2 languages
 - D) Type-3 languages
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27. A regular expression can be converted to which of the following automata?

- A) Deterministic Pushdown Automaton
 - B) Turing Machine
 - C) Non-deterministic Finite Automaton
 - D) Context-Free Grammar
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28. Which of the following is true regarding the relationship between regular expressions and regular grammars?

- A) Every regular expression can be converted into a left-linear grammar.
 - B) Regular expressions and regular grammars generate the same set of languages.
 - C) Only right-linear grammars can be converted to regular expressions.
 - D) Regular grammars are more expressive than regular expressions.
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29. What is the Chomsky classification of regular languages?

- A) Type-0
 - B) Type-1
 - C) Type-2
 - D) Type-3
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30. Which of the following statements is false about the conversion of a regular grammar to a finite automaton?

- A) Left-linear grammars can be directly converted to finite automata.
 - B) Right-linear grammars can be directly converted to finite automata.
 - C) Every regular grammar has an equivalent finite automaton.
 - D) Regular grammars and finite automata represent the same class of languages.
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31. What is a distinguishing feature of recursive and recursively enumerable sets?

- A) Recursive sets are accepted by a finite automaton.
 - B) Recursively enumerable sets are always context-free.
 - C) Recursive sets have a decision procedure, while recursively enumerable sets do not.
 - D) Recursively enumerable sets are accepted by deterministic finite automata.
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32. Which of the following best describes a transition system in a finite automaton?

- A) A collection of states and transitions defined by a context-free grammar.
 - B) A set of rules that define how the automaton moves between states based on input symbols.
 - C) A sequence of operations on a stack data structure.
 - D) A process that determines whether a string is recursively enumerable.
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33. Which of the following is not a property of regular languages?

- A) Closure under union
 - B) Closure under concatenation
 - C) Closure under intersection
 - D) Closure under context-free operations
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34. Which of the following is true about the relationship between finite automata and regular expressions?

- A) Finite automata can recognize some languages that regular expressions cannot represent.
 - B) Every finite automaton has an equivalent regular expression that represents the same language.
 - C) Regular expressions are more expressive than finite automata.
 - D) Regular expressions cannot be used to describe the languages accepted by a DFA.
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35. Which of the following is not an identity of regular expressions?

- A) $r + r = r$
- B) $r + s = s + r$
- C) $r(r^*) = r^*$
- D) $r(s + t) = rs + rt$

