Summary in Graph

Exam Summary (GO Classes Test Series 2024 | Theory of Computation | Test 1)

Qs. Attempted:	**12** (5 + 7)	**Correct Marks:**	**8** (4 + 4)
Correct Attempts:	**6** (4 + 2)	**Penalty Marks:**	**0.33** (0.33 + 0)
Incorrect Attempts:	**6** (1 + 5)	**Resultant Marks:**	**7.66** (3.66 + 4)

Total Questions:	**15** (5 + 10)
Total Marks:	**25** (5 + 20)
Exam Duration:	**45 Minutes**
Time Taken:	**45 Minutes**

EXAM RESPONSE | EXAM STATS | FEEDBACK

Technical

Q #1 | Multiple Select Type | Award: 1 | Penalty: 0 | Theory of Computation

Note the following abbreviations:

DFA = Deterministic Finite Automata NFA = Nondeterministic Finite Automata.

Which of the following is/are False?

A. A DFA is equivalent in expressive power to an NFA.
B. A finite automaton cannot recognize any infinite language.
C. The language $\{0^n 0^n \mid n >= 0\}$ is regular.
D. For every NFA with n states, there is an equivalent DFA with exactly 2^n states.

Your Answer: B | **Correct Answer: B** | Correct | Discuss

Q #2 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Theory of Computation

The minimal deterministic finite automata for the language $\mathrm{L} = \{1^m \quad \mid \mathrm{m} \geq 0 \text{ and } \mathrm{m} \neq 3\}$ over alphabet $\Sigma = \{0, 1\}$ will have

A. 5 states and 4 final states
B. 6 states and 5 final states

C. 3 states and 1 final states
D. 6 states and 4 final states

Your Answer: A | Correct Answer: D | Incorrect | Discuss

Q #3 | Numerical Type | Award: 1 | Penalty: 0 | Theory of Computation

Number of states in the minimal DFA which accepts the language over the alphabet $\Sigma = \{\mathrm{a}, \mathrm{b}\}$ such that the language consists of all strings that contain at least one occurrence of each symbol in Σ.

Your Answer: 4 | Correct Answer: 4 | Correct | Discuss

Q #4 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Theory of Computation

Let M be a finite automaton and let M' be obtained from M by interchanging the collections of accepting and non-accepting states. i.e. If Q is the set of states in M and F is the set of accepting states in M then $\mathrm{Q} \backslash \mathrm{F}$ is the set of accepting states in M'.
Now consider the following statements :

1. If M is deterministic, then the language accepted by M' is the complement of the language accepted by M.
2. If M is Non-deterministic, then the language accepted by M' is the complement of the language accepted by M.

Which of the above is/are correct?

A. Only 1
B. Only 2
C. Both
D. None

Your Answer: A | Correct Answer: A | Correct | Discuss

Q #5 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Theory of Computation

Let L_1 be the language $\{a, aa, aaa\}$ and let L_2 be the language of all strings not in $\{a, aa, aaa\}$. Let the number of states in the minimal DFA that accepts L_1 and L_2 be 'm' and 'n' respectively. Then which of the following is correct?

A. $m > n$
B. $n = m$
C. $m < n$
D. Can't say anything about m and n.

Your Answer: B | Correct Answer: B | Correct | Discuss

Q #6 | Multiple Select Type | Award: 2 | Penalty: 0 | Theory of Computation

Which of the following statements is/are true?

A. Let $\mathrm{M} = (\mathrm{Q}, \Sigma, \delta, q0, \ \mathrm{F})$ be a DFA. If F contains at least one state, the language of M must be nonempty.

B. Let A and B be regular languages. Let A-B consist of all the strings in A which are not in B (this is sometimes written $\mathrm{A} \backslash \mathrm{B}$ and is also called the set difference). Then A-B is regular.

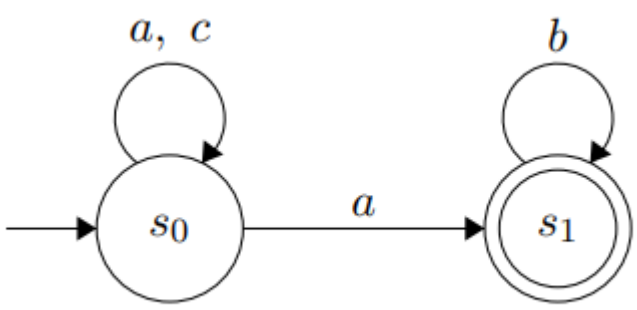
C. Let $\mathrm{M}=(\mathrm{Q}, \Sigma, \delta, q 0, \mathrm{F})$ be a DFA. If F is empty (i.e. No final state), the language of M must be empty.

D. Let $\mathrm{M}=(\mathrm{Q}, \Sigma, \delta, q 0, \mathrm{F})$ be a DFA. If F contains $q 0$, the language of M must be nonempty.

Your Answer: C **Correct Answer: B;C;D** Incorrect Discuss

Q #7 Numerical Type Award: 2 Penalty: 0 Theory of Computation

Consider the following NFA(Nondeterministic Finite Automata) N over alphabet $\Sigma=\{a, b, c\}$, recognizing the language $L(N)$:

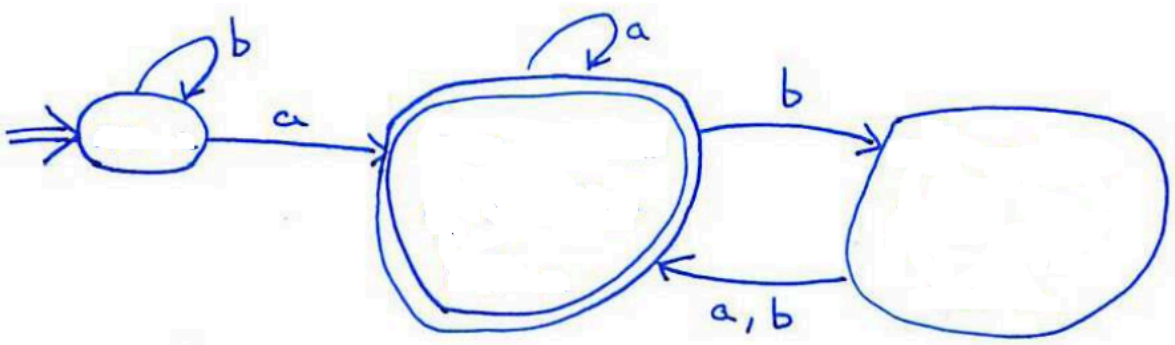


What will be the number of states in the minimal DFA(Deterministic Finite Automata) for $L(N)$?

Your Answer: 3 **Correct Answer: 4** Incorrect Discuss

Q #8 Multiple Choice Type Award: 2 Penalty: 0.67 Theory of Computation

Which of the following is the Language accepted by this automata?



A. Set of all strings ending with a.

B. Set of strings with at least one a and an even number of $b's$.

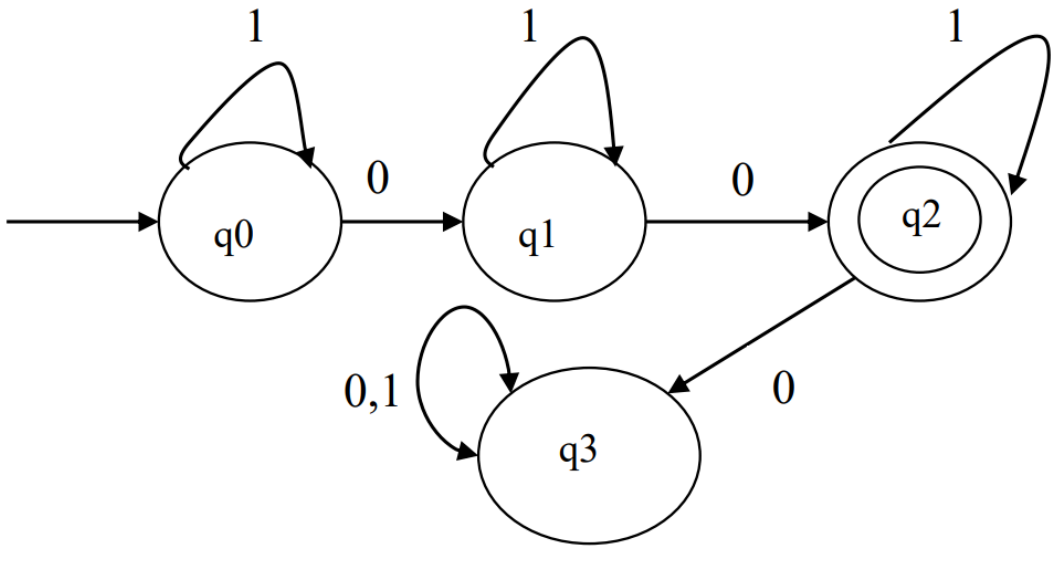
C. Set of strings with at least one a and an even number of $b's$ following the last a.

D. Set of strings ending with a and an even number of $b's$ following the last a.

Your Answer: C **Correct Answer: C** Correct Discuss

Q #9 Numerical Type Award: 2 Penalty: 0 Theory of Computation

Let M be the Deterministic Finite Automata (DFA) shown below:



The DFA shown above describes a context-free language L over input alphabet $= \{0, 1\}$. How many strings of length 10 over $\{0, 1\}$ do not belong to L?

Your Answer: 986 **Correct Answer: 979** Incorrect Discuss

Q #10 Multiple Select Type | Award: 2 | Penalty: 0 | Theory of Computation

The following statement is known as "the pumping lemma for regular language":

If A is a regular language, then there is a number p (the pumping length) where, if s is any string in A of length at least p, then s can be divided into 3 pieces, $s = xyz$, satisfying the following conditions:

1. For each $i \geq 0, xy^iz \in \mathrm{A}$,
2. $|y| > 0$, and
3. $|xy| \leq p$

Your friend John is trying to prove that the language ww^R, the language of even length palindromes over $\{0, 1\}$, is not regular.
For pumping length p he chooses the string S. Which of the following strings, can he use for the pumping lemma for regular languages to prove that this language is not regular?

A. $\mathrm{S} = 01^p1^p0$
B. $\mathrm{S} = 1^p01^p$
C. $\mathrm{S} = 0^p1^p1^p0^p$
D. $\mathrm{S} = 0^p1^p0^p1^p$

Your Answer: **Correct Answer: C** Not Attempted Discuss

Q #11 Multiple Choice Type | Award: 2 | Penalty: 0.67 | Theory of Computation

Consider the following statements :

1. If a deterministic finite automaton M accepts at least one string, then it accepts at least one string whose length is less than the number of states in M.
2. If a non-deterministic finite automaton M accepts at least one string, then it accepts at least one string whose length is less than the number of states in M.

Which of the above statements is/are true?

A. Only 1
B. Only 2
C. Both
D. None

Your Answer: C | Correct Answer: C | Correct | Discuss

Q #12 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Theory of Computation

Suppose that L is a language over a finite alphabet Σ with the property that for each number $\ell \geqslant 1$ there is some string w in L with *length*$(w) \geqslant \ell$ such that no matter how w is split up into three pieces $w = u_1 v u_2$ with *length*$(u_1 v) \leqslant \ell$ and *length*$(v) \geqslant 1$, there is some $n \geqslant 0$ for which $u_1 v^n u_2$ is not in L.

Which of the following statements is true?

A. L is necessarily regular.
B. L is necessarily non-regular.
C. L may be regular or non-regular.
D. L is finite.

Your Answer: | Correct Answer: B | Not Attempted | Discuss

Q #13 | Multiple Select Type | Award: 2 | Penalty: 0 | Theory of Computation

Suppose that you are given the DFA D of a regular language L. We know that L is finite and that D has 100 states. Which of the following is a viable possibility?

A. L contains some string of length 100.
B. L contains some string of length 99.
C. L is empty.
D. The pumping length of L is 50.

Your Answer: B | Correct Answer: C;D | Incorrect | Discuss

Q #14 | Multiple Select Type | Award: 2 | Penalty: 0 | Theory of Computation

Which of the following languages is/are regular?

A. $\mathrm{L} = \{w \mid w$ contains an equal number of occurrences of the substrings 01 and $10\}$
B. The language $\mathrm{L} = \{w \mid w$ is divisible by 3 when considered as a binary number$\}$
C. $\mathrm{L} = \{w \mid w$ contains an equal number of occurrences of the substrings 01 and $11\}$
D. $\mathrm{L} = \{w \mid w$ contains an equal number of occurrences of the substrings 01 and $1\}$

Your Answer: A;B;C;D | Correct Answer: A;B;D | Incorrect | Discuss

Q #15 | Numerical Type | Award: 2 | Penalty: 0 | Theory of Computation

Let D be some DFA (Deterministic Finite Automata) with 10 states and let the cardinality of the input alphabet set be 3. If the language accepted by D i.e., $\mathrm{L}(\mathrm{D})$ is finite, the maximum value of $|\mathrm{L}(\mathrm{D})|$ will be _____, ($|\mathrm{L}(\mathrm{D})|$ denotes the cardinality of $\mathrm{L}(\mathrm{D})$)

Your Answer: | Correct Answer: 9841 | Not Attempted | Discuss

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