1. How many strings of length less than 4 contains the language described by the regular expression (x+y)*y(a+ab)*?
   a) 7
   b) 10
   c) 12
   d) 11

   Answer: c

2. Which of the following is true?
   a) (01)*0 = 0(10)*
   b) (0+1)*0(0+1)*1(0+1) = (0+1)*01(0+1)*
   c) (0+1)*01(0+1)*+1*0* = (0+1)*
   d) All of the mentioned

   Answer: d

3. A language is regular if and only if
   a) accepted by DFA
   b) accepted by PDA
   c) accepted by LBA
   d) accepted by Turing machine
   Answer: a

4. Regular grammar is
   a) context free grammar
   b) non context free grammar
   c) english grammar
   d) none of the mentioned
   Answer: a

5. Let the class of language accepted by finite state machine be L1 and the class of languages represented by regular expressions be L2 then
   a) L1<L2
   b) L1>=L2
   c) L1 U L2 = .*
   d) L1=L2
   Answer: d

6. Which of the following is not a regular expression?
   a) [(a+b)*-(aa+bb)]*
   b) [(0+1)-(0b+a1)*(a+b)]*
   c) (01+11+10)*
   d) (1+2+0)*(1+2)*
   Answer: b

7. Regular expression are
   a) Type 0 language
   b) Type 1 language
   c) Type 2 language
   d) Type 3 language
   Answer: d

8. Which of the following is true?
a) Every subset of a regular set is regular
b) Every finite subset of non-regular set is regular
c) The union of two non regular set is not regular
d) Infinite union of finite set is regular
Answer: b

9. L and ~L are recursive enumerable then L is
a) Regular
b) Context free
c) Context sensitive
d) Recursive
Answer: d

10. Regular expressions are closed under
a) Union
b) Intersection
c) Kleen star
d) All of the mentioned
Answer: d

1. Assume the R is a relation on a set A, aRb is partially ordered such that a and b are _____
a) reflexive
b) transitive
c) symmetric
d) reflexive and transitive
Answer: d

2. The non- Kleene Star operation accepts the following string of finite length over set A = {0,1} | where string s contains even number of 0 and 1
a) 01,0011,010101
b) 0011,11001100
c) ε,0011,11001100
d) ε,0011,11001100
Answer: b

3. A regular language over an alphabet ∑ is one that cannot be obtained from the basic languages using the operation
a) Union
b) Concatenation
c) Kleene*
d) All of the mentioned
Answer: d

4. Statement 1: A Finite automata can be represented graphically; Statement 2: The nodes can be its states; Statement 3: The edges or arcs can be used for transitions
Hint: Nodes and Edges are for trees and forests too.
Which of the following make the correct combination?
a) Statement 1 is false but Statement 2 and 3 are correct
b) Statement 1 and 2 are correct while 3 is wrong
c) None of the mentioned statements are correct
d) All of the mentioned
Answer: d

5. The minimum number of states required to recognize an octal number divisible by 3 are/is
a) 1
b) 3
c) 5
d) 7
Answer: b

6. Which of the following is not a part of 5-tuple finite automata?
a) Input alphabet
b) Transition function
c) Initial State
d) Output Alphabet Answer: d

7. If an Infinite language is passed to Machine M, the subsidiary which gives a finite solution to the infinite input tape is _____
a) Compiler
b) Interpreter
c) Loader and Linkers
d) None of the mentioned
Answer: a

8. The number of elements in the set for the Language L={xϵ(∑r) *|length if x is at most 2} and ∑={0,1} is _____
a) 7
b) 6
c) 8
d) 5
Answer: a

9. For the following change of state in FA, which of the following codes is an incorrect option?
a) δ (m, 1) = n
b) δ (0, n) = m
c) δ (m,0) = ε
d)s: accept = false; cin >> char; if char = "0" goto n;

Answer: b

10. Given: ∑= {a, b}
L= {xϵ∑*|x is a string combination}
∑4 represents which among the following?
a) {aa, ab, ba, bb}
b) {aaaa, abab, ε, abaa, aabb}
c) {aaa, aab, aba, bbb}
d) All of the mentioned
Answer: b

11. Moore Machine is an application of:
a) Finite automata without input
b) Finite automata with output
c) Non Finite automata with output
d) None of the mentioned
Answer: b

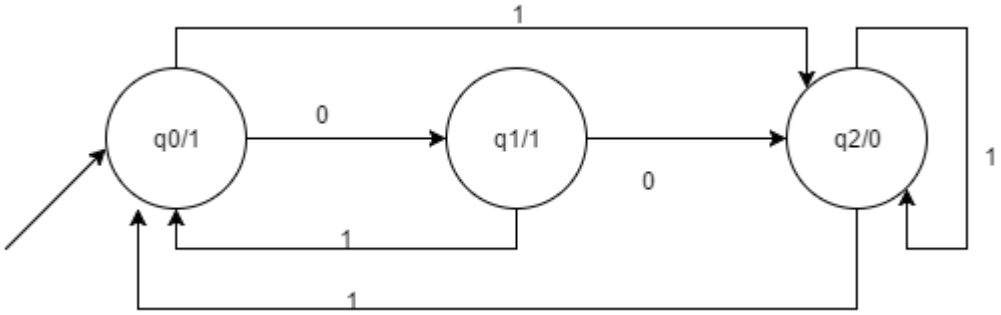
12. In Moore machine, output is produced over the change of:
a) transitions
b) states
c) all of the mentioned
d) none of the mentioned Answer: b

13. For a give Moore Machine, Given Input='101010', thus the output would be of length:
a) |Input|+1
b) |Input|
c) |Input-1|
d) Cannot be predicted
Answer: a

14. Statement 1: Null string is accepted in Moore Machine.
Statement 2: There are more than 5-Tuples in the definition of Moore Machine.
Choose the correct option:
a) Statement 1 is true and Statement 2 is true
b) Statement 1 is true while Statement 2 is false
c) Statement 1 is false while Statement 2 is true
d) Statement 1 and Statement 2, both are false
Answer: a

15. The total number of states and transitions required to form a moore machine that will produce residue mod 3.
a) 3 and 6
b) 3 and 5
c) 2 and 4
d) 2 and 5
Answer: a

16. Complete the given table according to the given Moore machine.



Present State

a) Q0, Q2, 0
b) Q0, Q2, 1
c) Q1, Q2, 1
d) Q1, Q0, 0
Answer: a

17. What is the output for the given language?
Language: A set of strings over ∑= {a, b} is taken as input and it prints 1 as an output "for every occurrence of a, b as its substring. (INPUT: abaaab)
a) 0010001
b) 0101010

c) 0111010
d) 0010000
Answer: a

18. The output alphabet can be represented as:
a) δ
b) Δ
c) ∑
d) None of the mentioned
Answer: b

19. The O/P of Moore machine can be represented in the following format:
a) Op(t)=δ(Op(t))
b) Op(t)=δ(Op(t)i(t))
c) Op(t): ∑
d) None of the mentioned
Answer: a

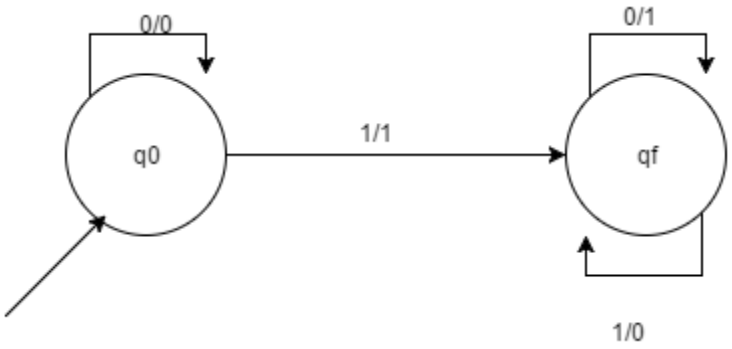
20. Which of the following is a correct statement?
a) Moore machine has no accepting states
b) Mealy machine has accepting states
c) We can convert Mealy to Moore but not vice versa
d) All of the mentioned
Answer: a

Mealy Machine

1. In mealy machine, the O/P depends upon?
a) State
b) Previous State
c) State and Input
d) Only Input
Answer: c

2. Which of the given are correct?
a) Moore machine has 6-tuples
b) Mealy machine has 6-tuples
c) Both Mealy and Moore has 6-tuples
d) None of the mentioned
Answer: c

3. The following mealy machine outputs which of the following?



a) 9’s Complement
b) 2’s Complement
c) 1’s Complement
d) 10’s Complement
Answer: b

4. The O/P of Mealy machine can be represented in the following format:
a) Op(t)= δ(Op(t))
b) Op(t)= δ(Op(t)i(t))
c) Op(t): ∑
d) None of the mentioned
Answer: b

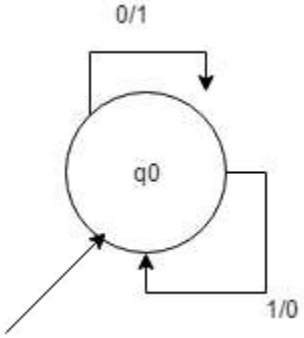
5.The ratio of number of input to the number of output in a mealy machine can be given as:
a) 1
b) n: n+1
c) n+1: n
d) none of the mentioned
Answer: a

6. Mealy and Moore machine can be categorized as:
a) Inducers
b) Transducers
c) Turing Machines
d) Linearly Bounder Automata
Answer: b

7. The major difference between Mealy and Moore machine is about:
a) Output Variations
b) Input Variations
c) All of the mentioned
d) None of the mentioned
Answer: a

8. Statement 1: Mealy machine reacts faster to inputs.
Statement 2: Moore machine has more circuit delays.
Choose the correct option:
a) Statement 1 is true and Statement 2 is true
b) Statement 1 is true but Statement 2 is false
c) Statement 1 is false and Statement 2 is true
d) None of the mentioned is true
Answer: a

9. Which of the following does the given Mealy machine represents?



a) 9’s Complement
b) 2’s Complement
c) 1’s Complement
d) 10’s Complement
Answer: c

10. Which one of the following is true?
A mealy machine
a) produces a language
b) produces a grammar
c) can be converted to NFA
d) has less circuit delays
Answer: d

Mealy Machine-II

1. Which of the following does not belong to input alphabet if S={a, b}* for any language?
a) a
b) b
c) e
d) none of the mentioned
Answer: c

2. The number of final states we need as per the given language?
Language L: {a^n| n is even or divisible by 3}
a) 1

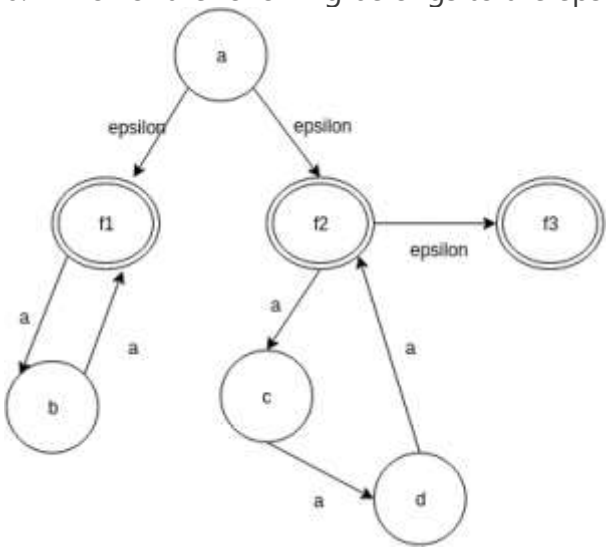
b) 2
c) 3
d) 4
Answer: b

3. An e-NFA is _____ in representation.
a) Quadruple
b) Quintuple
c) Triple
d) None of the mentioned
Answer: b

4. State true or false:
Statement: Both NFA and e-NFA recognize exactly the same languages.
a) true
b) false
Answer: a

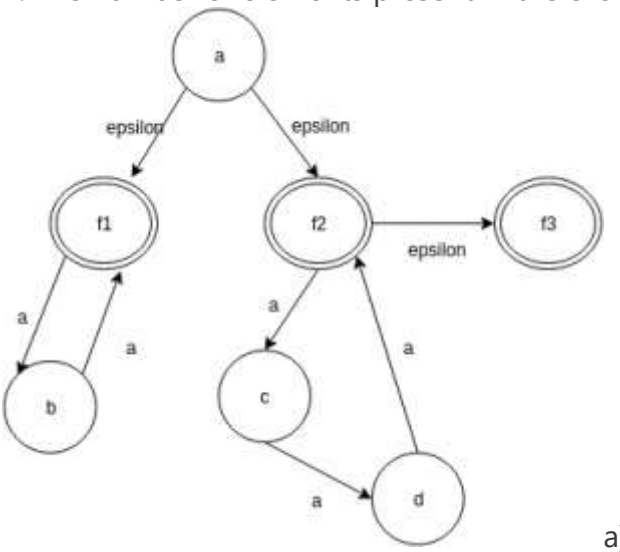
5. Design a NFA for the language:
L: {an| n is even or divisible by 3}
Which of the following methods can be used to simulate the same.
a) e-NFA
b) Power Construction Method
c) Both e-NFA and Power Construction Method
d) None of the mentioned
Answer: c

6. Which of the following belongs to the epsilon closure set of a?



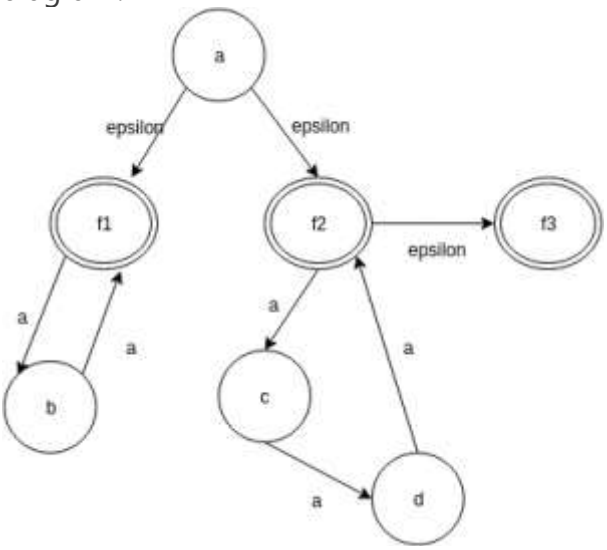
a) {f1, f2, f3}
b) {a, f1, f2, f3}
c) {f1, f2}
d) none of the mentioned
Answer: b

7. The number of elements present in the e-closure(f2) in the given diagram:



a) 0
b) 1
c) 2
d) 3
Answer: c

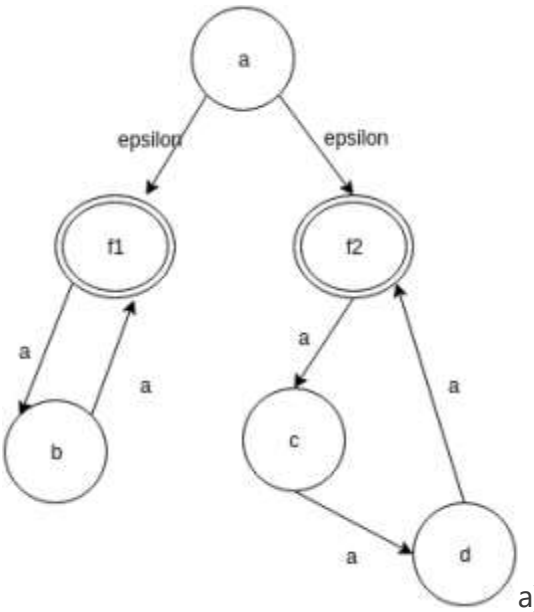
8. Which of the steps are non useful while eliminating the e-transitions for the given diagram?



a) Make a as accepting state of N' if ECLOSE(p) contains an accepting state of N
b) Add an arc a to f1 labelled a if there is an arc labelled a in N from some state in ECLOSE(a) to f1
c) Delete all arcs labelled as e
d) None of the mentioned
Answer: d

9. Is the language preserved in all the steps while eliminating epsilon transitions from a NFA?
a) yes
b) no Answer: a

10. Remove all the epsilon transitions in the given diagram and compute the number of a-transitions in the result?



a) 5
b) 7
c) 9
d) 6

Answer: b

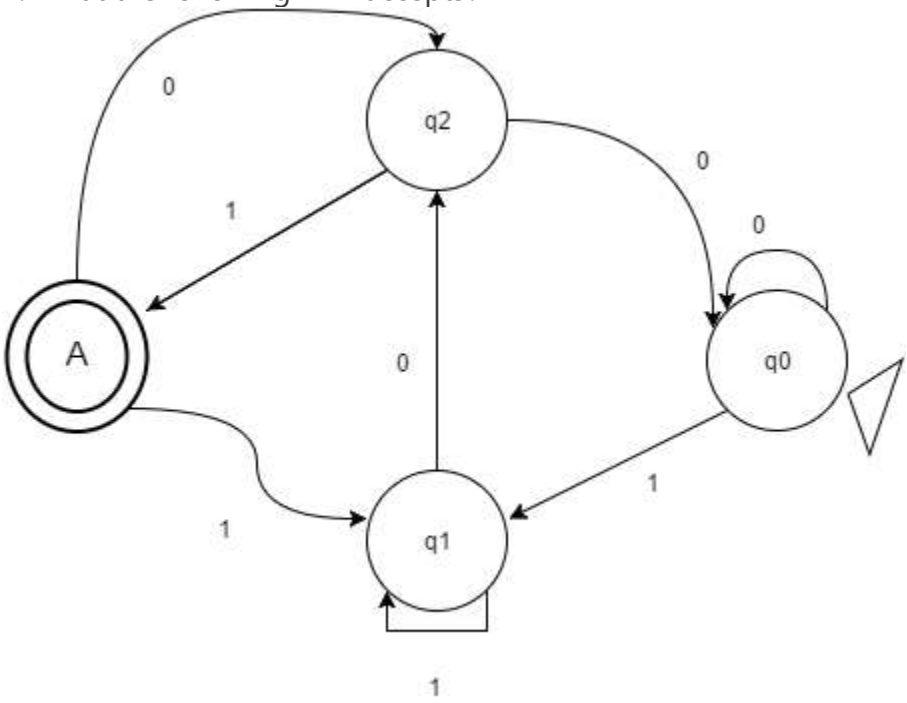
Deterministic Finite Automata-Introduction and Definition

1. Which of the following not an example Bounded Information?
a) fan switch outputs {on, off}
b) electricity meter reading
c) colour of the traffic light at the moment
d) none of the mentioned
Answer: b

2. A Language for which no DFA exist is a_____
a) Regular Language
b) Non-Regular Language
c) May be Regular
d) Cannot be said
Answer: b

3. A DFA cannot be represented in the following format
a) Transition graph
b) Transition Table
c) C code
d) None of the mentioned Answer: d

4. What the following DFA accepts?

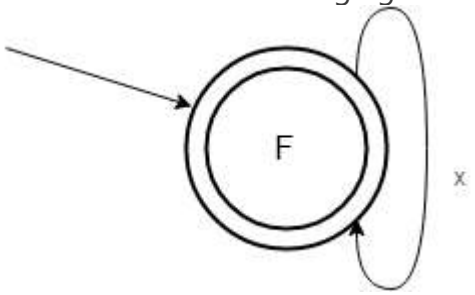


a) x is a string such that it ends with ‘101’
b) x is a string such that it ends with ‘01’
c) x is a string such that it has odd 1’s and even 0’s
d) x is a strings such that it has starting and ending character as 1

Answer: a

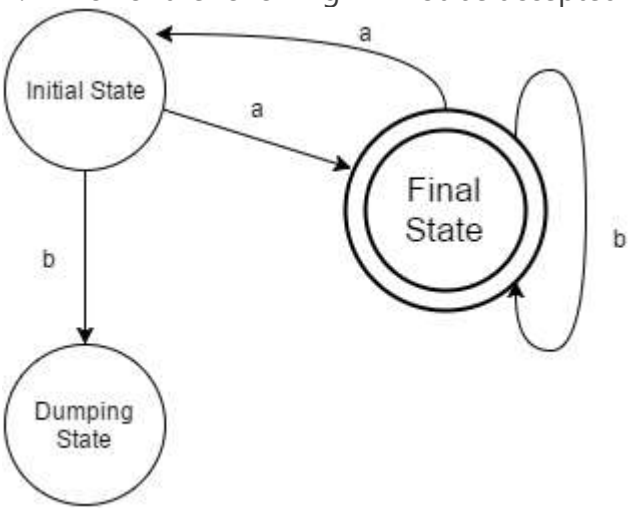
5. When are 2 finite states equivalent?
a) Same number of transitions
b) Same number of states
c) Same number of states as well as transitions
d) Both are final states
Answer: c

6. What does the following figure most correctly represents?



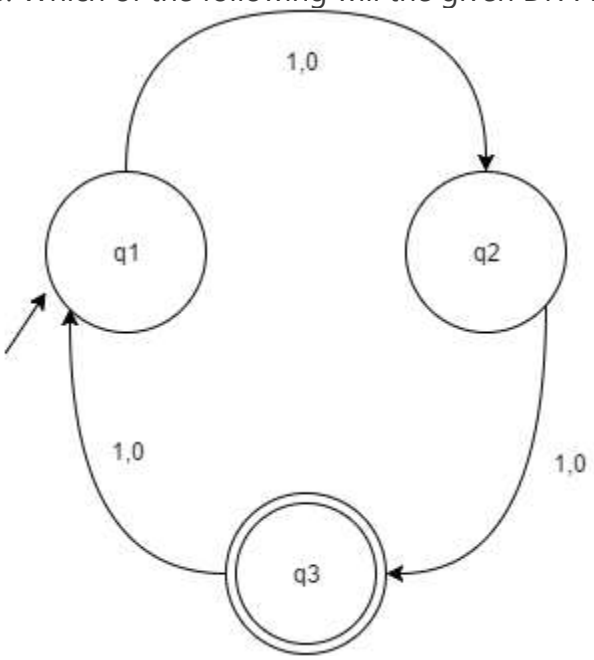
a) Final state with loop x
b) Transitional state with loop x
c) Initial state as well as final state with loop x
d) Insufficient Data
Answer: c

7. Which of the following will not be accepted by the following DFA?



a) ababaabaa
b) abbbaa
c) abbbaabb
d) abbaabbaa
Answer: a

8. Which of the following will the given DFA won't accept?



a) ε
b) 11010
c) 10001010
d) String of letter count 11
Answer: a

9. Can a DFA recognize a palindrome number?
a) Yes
b) No

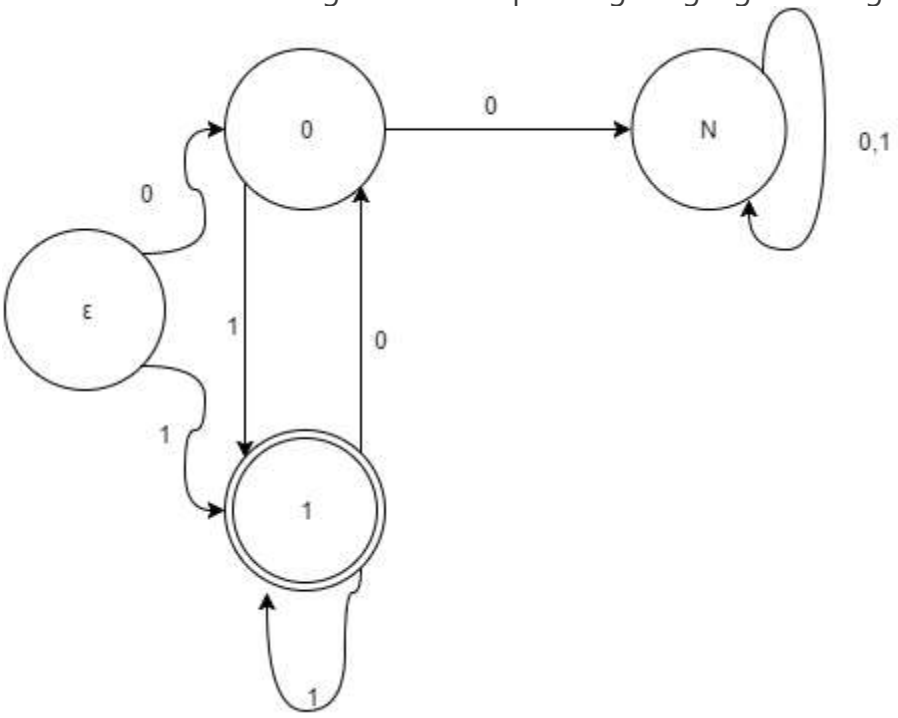
c) Yes, with input alphabet as ∑*
d) Can't be determined
Answer: b

10. Which of the following is not an example of finite state machine system?
a) Control Mechanism of an elevator
b) Combinational Locks
c) Traffic Lights
d) Digital Watches
Answer: d

DFA Processing Strings

1. The password to the admins account="administrator". The total number of states required to make a password-pass system using DFA would be _____
a) 14 states
b) 13 states
c) 12 states
d) A password pass system cannot be created using DFA
Answer: a

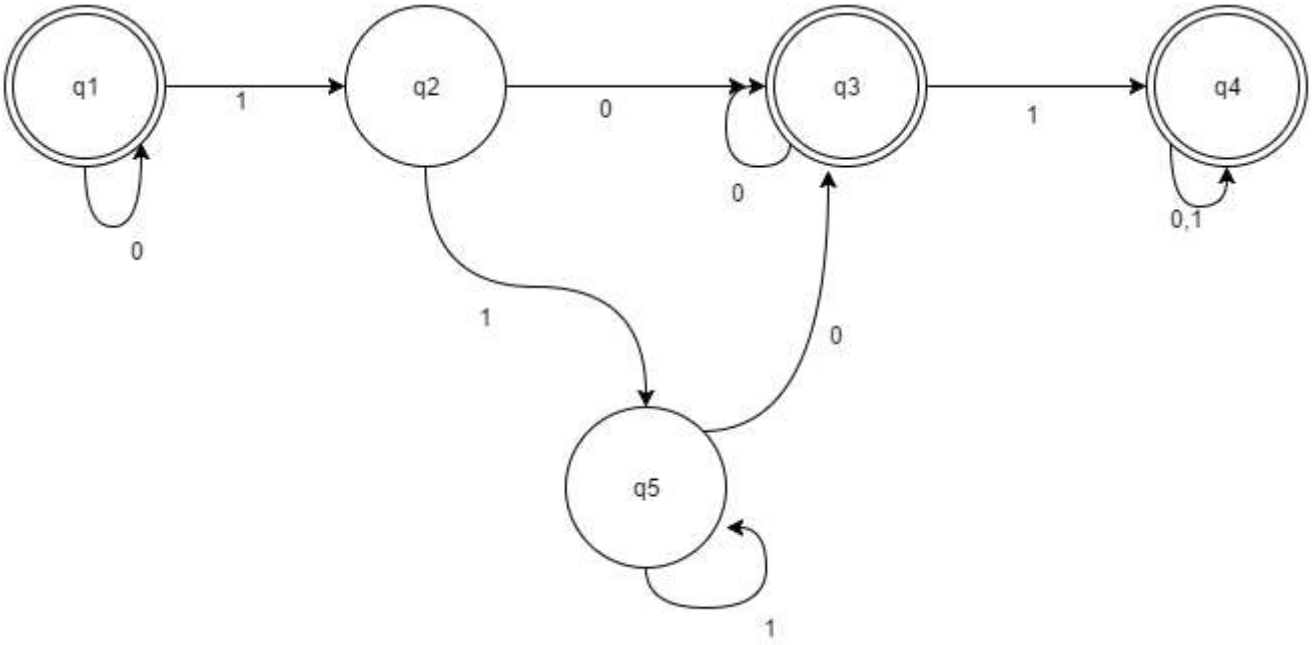
2. Which of the following is the corresponding Language to the given DFA?



a) L = {x ϵ {0, 1} * | x ends in 1 and does not contain substring 01}
b) L = {x ϵ {0,1} * |x ends in 1 and does not contain substring 00}
c) L = {x ϵ {0,1} |x ends in 1 and does not contain substring 00}
d) L = {x ϵ {0,1} * |x ends in 1 and does not contain substring 11}
Answer: b

3. Let ∑= {a, b, …. z} and A = {Hello, World}, B= {Input, Output}, then (A*∩B) U (B*∩A) can be represented as:
a) {Hello, World, Input, Output, ε}
b) {Hello, World, ε}
c) {Input, Output, ε}
d) {}
Answer: d

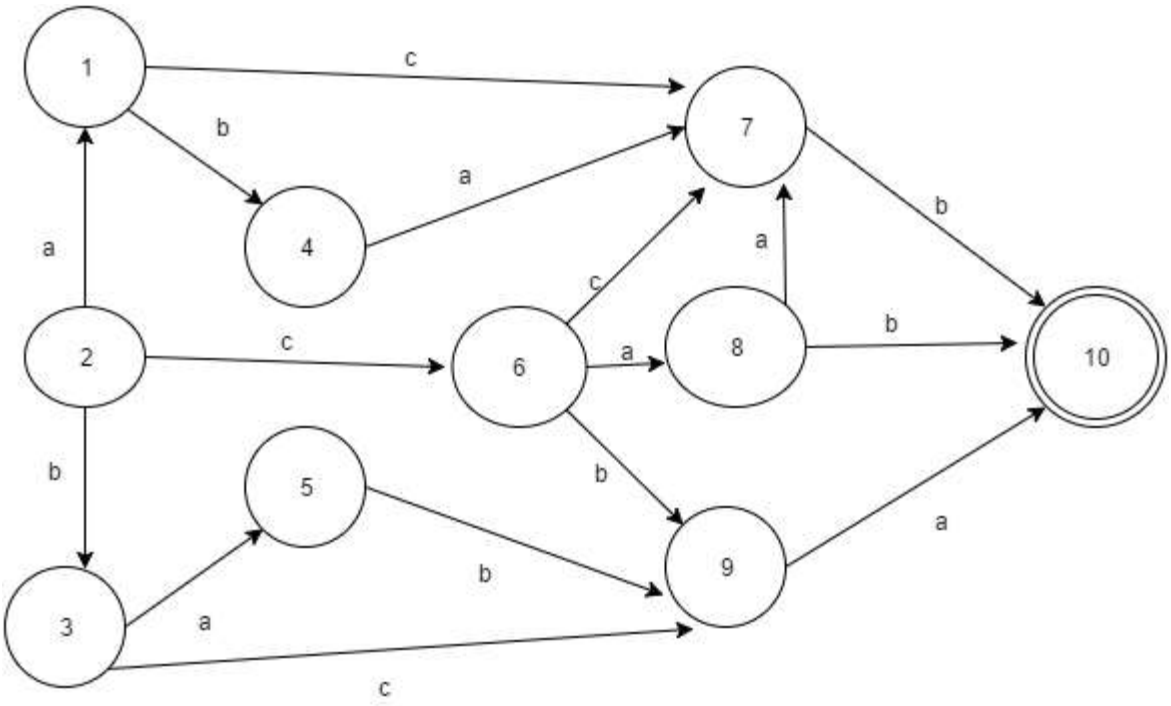
4. Let the given DFA consist of x states. Find x-y such that y is the number of states on minimization of DFA?



a) 3
b) 2
c) 1
d) 4
Answer: b

5. For a machine to surpass all the letters of alphabet excluding vowels, how many number of states in DFA would be required?
a) 3
b) 2
c) 22
d) 27
Answer: a

6. For the DFA given below compute the following:
Union of all possible combinations at state 7,8 and 9.



a) {aba, ac, cc, ca, cb, bc, bab, ca}
b) {bab, bc, ac, aba, ca, aac, ccb}
c) {cc, ca, cb, aba, bab, ac}
d) {aba, ac, cc, ca, cb, bc, bab, caa}
Answer: d

7. Given L= {X∈∑*= {a, b} |x has equal number of a, s and b's}.
Which of the following property satisfy the regularity of the given language?
a) Regularity is dependent upon the length of the string
b) Regularity is not dependent upon the length of the string
c) Can't be said for a particular string of a language
d) It may depend on the length of the string
Answer: b

8. Given:
L= {x∈∑= {0,1} |x=0n1n for n>=1}; Can there be a DFA possible for the language?
a) Yes
b) No
Answer: b

9. δ(A,1) = B, δ(A,0) =A
Δ (B, (0,1)) =C
δ(C,0) = A (Initial state =A)
String="011001" is transit at which of the states?
a) A
b) C
c) B
d) Invalid String Answer: a

Simpler Notations

1.Given Language: L= {xϵ∑= {a, b} |x has a substring 'aa' in the production}. Which of the corresponding representation notate the same?

a)

States-Transitions	b	b
Q0	Q2	Q2
Q1	Q0	Q0
Q2	Q1	Q2

b)

States-Transitions	b	b
Q0	Q2	Q2
Q1	Q0	Q0
Q2	Q1	Q2

c)

States-Transitions	a	a
Q0	Q1	Q1
Q1	Q2	Q0
Q2	Q2	Q2

d)

States-Transitions	b	a
Q0	Q1	Q2
Q1	Q2	Q0
Q2	Q2	Q2

Answer: a

2.Let u='1101', v='0001', then uv=11010001 and vu= 00011101.Using the given information what is the identity element for the string?

a) u^{-1}

b) v^{-1}

c) $u^{-1}v^{-1}$

d) ε

Answer: d

3.Which of the following substring will the following notation result?

δ	0	1
Q0	Q1	Q4
Q1	Q4	Q2
Q2	Q3	Q3
Q3	Q2	Q2
Q4	Q4	Q4

a) 0101011

b) 0101010

c) 010100

d) 100001 Answer: c

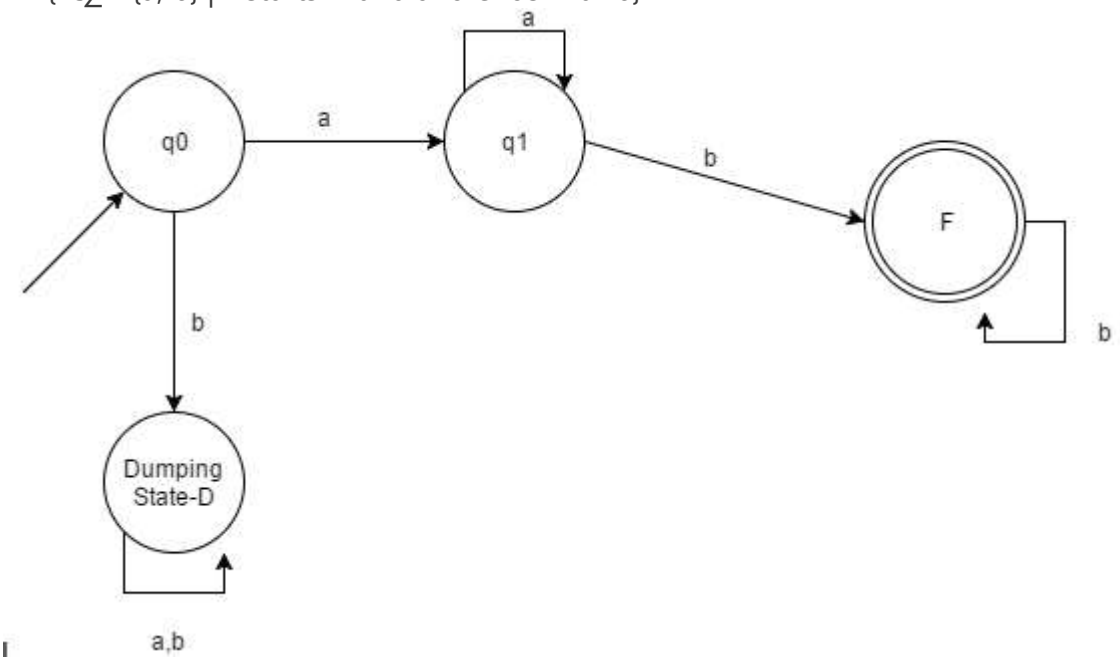
4.Predict the following step in the given bunch of steps which accepts a strings which is of even length and has a prefix='01'
δ (q0, ε) =q0 < δ(q0,0) =δ (δ (q0, ε),0) = δ(q0,0) =q1 < _____
a) δ (q0, 011) =δ (δ (q0,1), 1) =δ (q2, 1) =q3
b) δ (q0, 01) =δ (δ (q0, 0), 1) = δ (q1, 1) =q2
c) δ (q0, 011) =δ (δ (q01, 1), 1) =δ (q2, 0) =q3
d) δ (q0, 0111) =δ (δ (q0, 011), 0) = δ (q3, 1) =q2
Answer: b

5. Fill the missing blank in the given Transition Table:
Language L= {xϵ∑= {0,1} |x accepts all the binary strings not divisible by 3}

	0	1
Q0	Q0	Q1
Q1	Q2	Q0
Q2	_____	Q2

a) Q0
b) Q1
c) Q2
d) No Transition
Answer: b

6. Which among the following is the missing transition in the given DFA?
L= {xϵ∑= {a, b} | x starts with a and ends with b}



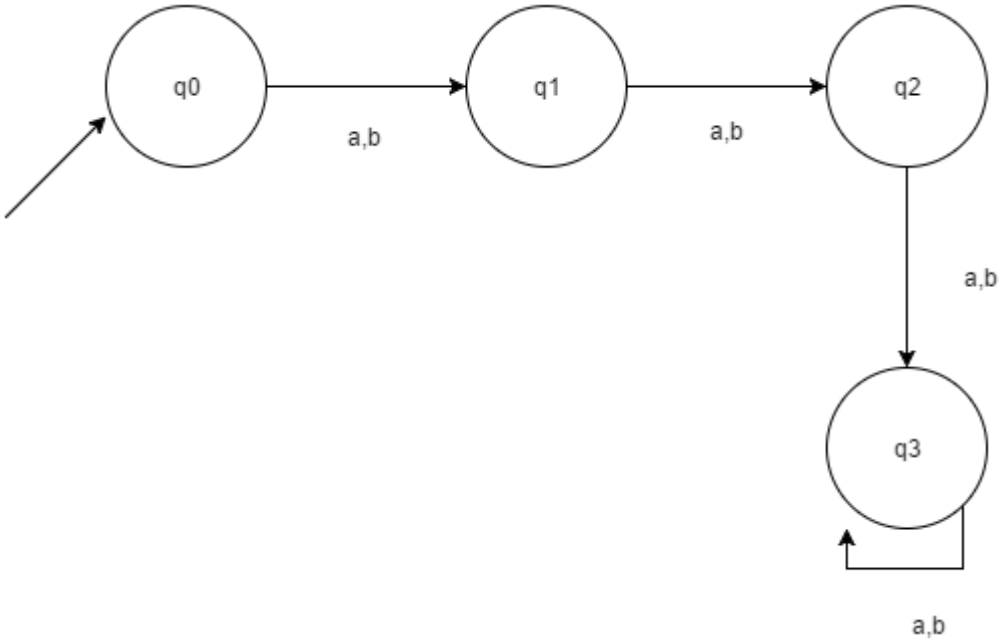
a) δ (q0, a) = q0
b) δ (F, a) = q1
c) δ (F, a) = D
d) δ (q1, a) = D
Answer: b

7. The complement of a language will only be defined when and only when the _____ over the language is defined.

a) String
b) Word
c) Alphabet
d) Grammar
Answer: c

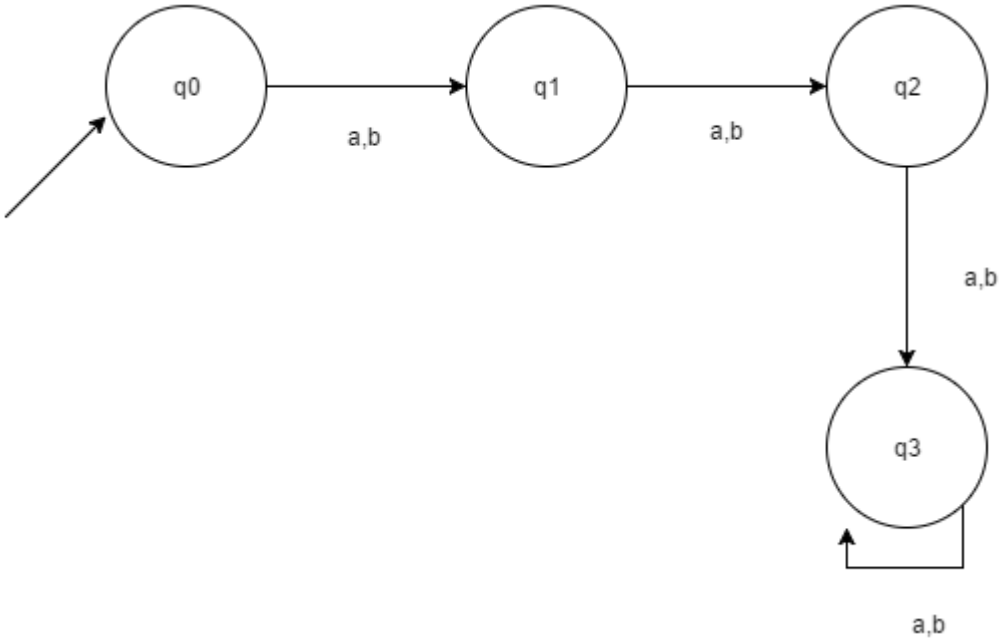
8. Which among the following is not notated as infinite language?
a) Palindrome
b) Reverse
c) Factorial
d) L={ab}*
Answer: c

9. Which among the following states would be notated as the final state/acceptance state?
L= {x∈∑= {a, b} | length of x is 2}



a) q1
b) q2
c) q1, q2
d) q3
Answer: b

10. Which of the following are the final states in the given DFA according to the Language given.?
L= {x∈∑= {a, b} |length of x is at most 2}



a) q0, q1
b) q0, q2
c) q1, q2
d) q0, q1, q2
Answer: d

The Language of DFA

1. How many languages are over the alphabet R?
   a) countably infinite
   b) countably finite
   c) uncountable finite
   d) uncountable infinite
   Answer: d

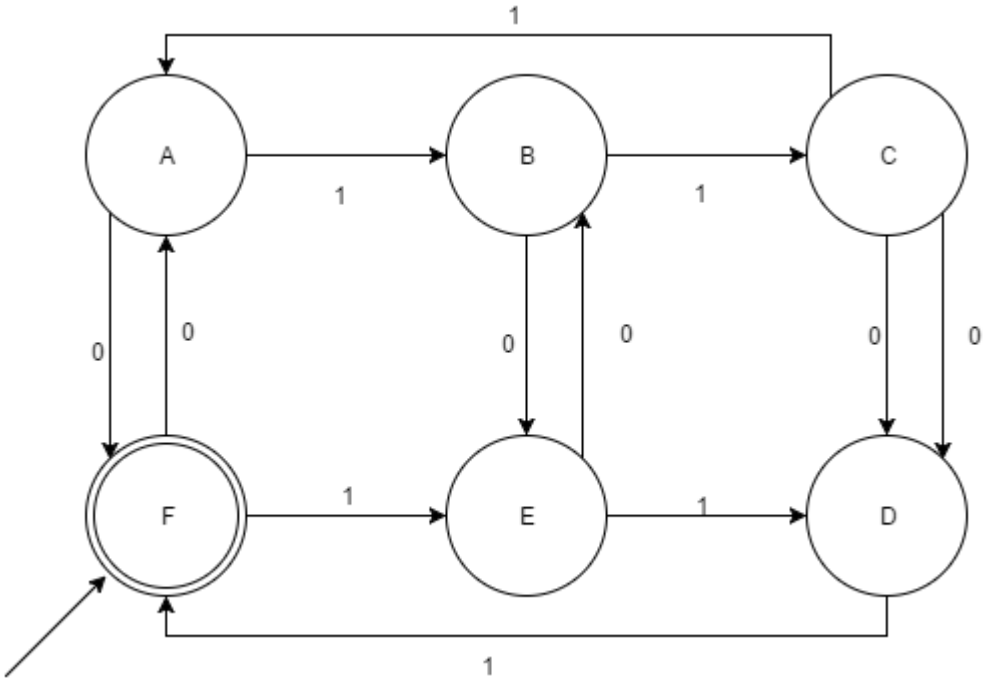
2. According to the 5-tuple representation i.e. FA= {Q, ∑, δ, q, F}
Statement 1: q ϵ Q'; Statement 2: FϵQ
a) Statement 1 is true, Statement 2 is false
b) Statement 1 is false, Statement 2 is true
c) Statement 1 is false, Statement 2 may be true
d) Statement 1 may be true, Statement 2 is false
Answer: b

3. δˆ tells us the best:
a) how the DFA S behaves on a word u
b) the state is the dumping state
c) the final state has been reached
d) Kleene operation is performed on the set
Answer: a

4. Which of the following option is correct?
A = {{abc, aaba}. {ε, a, bb}}
a) abcbb ₵ A
b) ε₵A
c) ε may not belong to A
d) abca ₵ A
Answer: b

5. For a DFA accepting binary numbers whose decimal equivalent is divisible by 4, what are all the possible remainders?
a) 0
b) 0,2
c) 0,2,4
d) 0,1,2,3
Answer: d

6. Which of the following x is accepted by the given DFA (x is a binary string ∑= {0,1})?



a) divisible by 3
b) divisible by 2
c) divisible by 2 and 3
d) divisible by 3 and 2
Answer: d

7. Given:
L1= {xϵ ∑*|x contains even no's of 0's}
L2= {xϵ ∑*|x contains odd no's of 1's}
No of final states in Language L1 U L2?
a) 1
b) 2

c) 3
d) 4
Answer: c

8. The maximum number of transition which can be performed over a state in a DFA?
∑= {a, b, c}
a) 1
b) 2
c) 3
d) 4
Answer: c

9. The maximum sum of in degree and out degree over a state in a DFA can be determined as:
∑= {a, b, c, d}
a) 4+4
b) 4+16
c) 4+0
d) depends on the Language
Answer: d

10. The sum of minimum and maximum number of final states for a DFA n states is equal to:
a) n+1
b) n
c) n-1
d) n+2
Answer: a

Finite Automata

1. There are _____ tuples in finite state machine.
a) 4
b) 5
c) 6
d) unlimited
Answer:b

2. Transition function maps.
a) Σ * Q -> Σ
b) Q * Q -> Σ
c) Σ * Σ -> Q
d) Q * Σ -> Q
Answer:d

3. Number of states require to accept string ends with 10.
a) 3
b) 2

c) 1
d) can’t be represented.
Answer:a

4. Extended transition function is .
a) Q * Σ* -> Q
b) Q * Σ -> Q
c) Q* * Σ* -> Σ
d) Q * Σ -> Σ
Answer:a

5. δ*(q,ya) is equivalent to .
a) δ((q,y),a)
b) δ(δ*(q,y),a)
c) δ(q,ya)
d) independent from δ notation
Answer:b

6. String X is accepted by finite automata if .
a) δ*(q,x) E A
b) δ(q,x) E A
c) δ*(Q0,x) E A
d) δ(Q0,x) E A
Answer:c

7. Languages of a automata is
a) If it is accepted by automata
b) If it halts
c) If automata touch final state in its life time
d) All language are language of automata
Answer:a

8. Language of finite automata is.
a) Type 0
b) Type 1
c) Type 2
d) Type 3
Answer:d

9. Finite automata requires minimum _____ number of stacks.
a) 1
b) 0
c) 2
d) None of the mentioned Answer:b

10. Number of final state require to accept Φ in minimal finite automata.
a) 1
b) 2

c) 3
d) None of the mentioned
Answer:d

11. Regular expression for all strings starts with ab and ends with bba is.
a) aba*b*bba
b) ab(ab)*bba
c) ab(a+b)*bba
d) All of the mentioned
Answer:c

12. How many DFA's exits with two states over input alphabet {0,1} ?
a) 16
b) 26
c) 32
d) 64
Answer:d

13. The basic limitation of finite automata is that
a) It can't remember arbitrary large amount of information.
b) It sometimes recognize grammar that are not regular.
c) It sometimes fails to recognize regular grammar.
d) All of the mentioned
Answer:a

14. Number of states require to simulate a computer with memory capable of storing '3' words each of length '8'.
a) $3 * 2^8$
b) $2^{(3*8)}$
c) $2^{(3+8)}$
d) None of the mentioned
Answer:b

15. FSM with output capability can be used to add two given integer in binary representation. This is
a) True
b) False
c) May be true
d) None of the mentioned
Answer:a

– Non Deterministic Finite Automata

1. Which of the following options is correct?
Statement 1: Initial State of NFA is Initial State of DFA.
Statement 2: The final state of DFA will be every combination of final state of NFA.
a) Statement 1 is true and Statement 2 is true
b) Statement 1 is true and Statement 2 is false

c) Statement 1 can be true and Statement 2 is true
d) Statement 1 is false and Statement 2 is also false
Answer: a

2. Given Language: L= {ab U aba}*
If X is the minimum number of states for a DFA and Y is the number of states to construct the NFA,
|X-Y|=?
a) 2
b) 3
c) 4
d) 1
Answer: a

3. An automaton that presents output based on previous state or current input:
a) Acceptor
b) Classifier
c) Transducer
d) None of the mentioned.
Answer: c

4. If NFA of 6 states excluding the initial state is converted into DFA, maximum possible number of states for the DFA is ?
a) 64
b) 32
c) 128
d) 127
Answer: c

5. NFA, in its name has 'non-deterministic' because of :
a) The result is undetermined
b) The choice of path is non-deterministic
c) The state to be transited next is non-deterministic
d) All of the mentioned
Answer: b

6. Which of the following is correct proposition?
Statement 1: Non determinism is a generalization of Determinism.
Statement 2: Every DFA is automatically an NFA
a) Statement 1 is correct because Statement 2 is correct
b) Statement 2 is correct because Statement 2 is correct
c) Statement 2 is false and Statement 1 is false
d) Statement 1 is false because Statement 2 is false
Answer: b

7. Given Language L= {xϵ {a, b}*|x contains aba as its substring}
Find the difference of transitions made in constructing a DFA and an equivalent NFA?
a) 2
b) 3
c) 4
d) Cannot be determined
Answer: a

8. The construction time for DFA from an equivalent NFA (m number of node)is:
a) $O(m^2)$
b) $O(2^m)$
c) O(m)
d) O(log m)
Answer: b

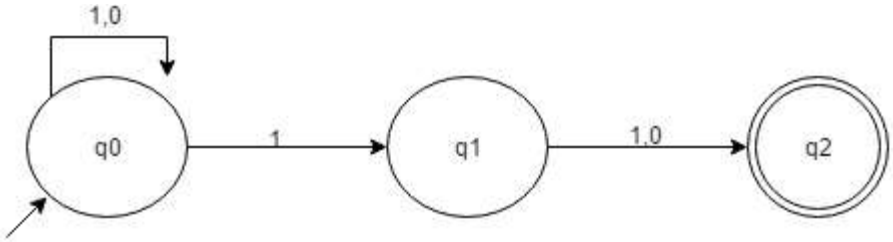
9. If n is the length of Input string and m is the number of nodes, the running time of DFA is x that of NFA.Find x?
a) $1/m^2$
b) 2^m
c) 1/m
d) log m
Answer: a

10. Which of the following option is correct?
a) NFA is slower to process and its representation uses more memory than DFA
b) DFA is faster to process and its representation uses less memory than NFA
c) NFA is slower to process and its representation uses less memory than DFA
d) DFA is slower to process and its representation uses less memory than NFA
Answer: c

Transition Function

1. The number of tuples in an extended Non Deterministic Finite Automaton:
a) 5
b) 6
c) 7
d) 4
Answer: a

2. Choose the correct option for the given statement:
Statement: The DFA shown represents all strings which has 1 at second last position.



a) Correct
b) Incorrect, Incomplete DFA
c) Wrong proposition
d) May be correct
Answer: c

3. What is wrong in the given definition?
Def: ({q0, q1, q2}, {0,1}, δ, q3, {q3})
a) The definition does not satisfy 5 Tuple definition of NFA
b) There are no transition definition
c) Initial and Final states do not belong to the Graph
d) Initial and final states can't be same
Answer: c

4. If δ is the transition function for a given NFA, then we define the δ′ for the DFA accepting the same language would be:
Note: S is a subset of Q and a is a symbol.
a) $\delta'(S, a) = U_{p \epsilon s}\ \delta(p, a)$
b) $\delta'(S, a) = U_{p \neq s}\ \delta(p, a)$
c) $\delta'(S, a) = U_{p \epsilon s}\ \delta(p)$
d) $\delta'(S) = U_{p \neq s}\ \delta(p)$
Answer: a

5. What is the relation between DFA and NFA on the basis of computational power?
a) DFA > NFA
b) NFA > DFA
c) Equal
d) Can't be said
Answer: c

6. If a string S is accepted by a finite state automaton, $S = s_1 s_2 s_3 \ldots\ldots s_n$ where $s_i \epsilon \sum$ and there exists a sequence of states r0, r1, r2…… rn such that $\delta(r(i), s_{i+1}) = r_{i+1}$ for each 0, 1, …n-1, then r(n) is:
a) initial state
b) transition symbol
c) accepting state
d) intermediate state Answer: c

7. According to the given table, compute the number of transitions with 1 as its symbol but not 0:

Q	Δ(q,0)	δ(q,1)
q0	{q0}	{q0, q1}
q1	{q2}	{q2}
q2	{q3}	{q3}
q3	Φ	Φ

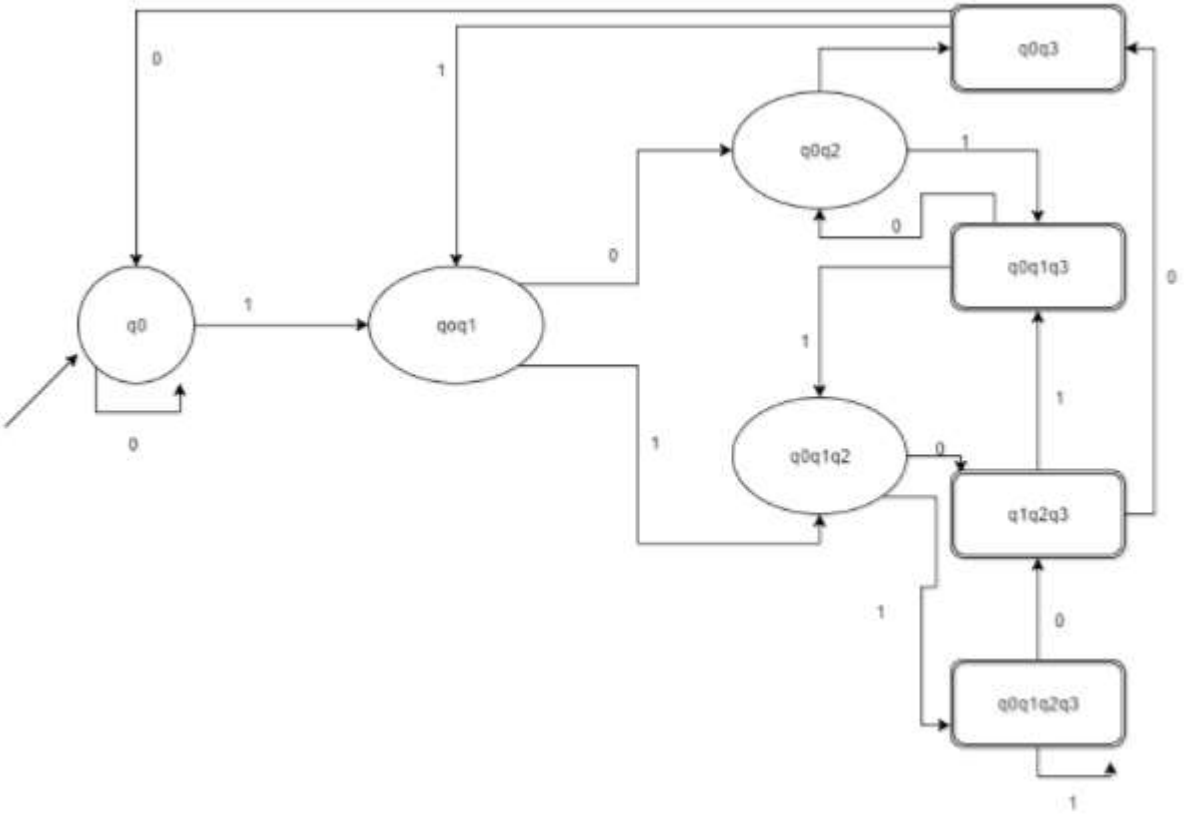
a) 4
b) 3
c) 2
d) 1
Answer: d

8. From the given table, δ*(q0, 011) =?

Q	Δ(q,0)	δ(q,1)
q0	{q0}	{q0, q1}
q1	{q2}	{q2}
q2	{q3}	{q3}
q3	Φ	Φ

a) {q0}
b) {q1} U {q0, q1, q2}
c) {q2, q1}
d) {q3, q1, q2, q0} Answer: b

9. Number of times the state q3 or q2 is being a part of extended 6 transition state is



a) 6
b) 5

c) 4
d) 7Answer: a

10. Predict the missing procedure:

δ	0	1
->Q0	Q0	Q0,Q1
Q1	Q2	Q2
*Q2	Φ	Φ

i.Δ(Q0, ε) ={Q0},
ii.Δ(Q0, 01) = {Q0, Q1}
iii.δ(Q0, 010) =?
a) {Q0, Q1, Q2}
b) {Q0, Q1}
c) {Q0, Q2}
d) {Q1, Q2}

Answer: c

The Language of NFA

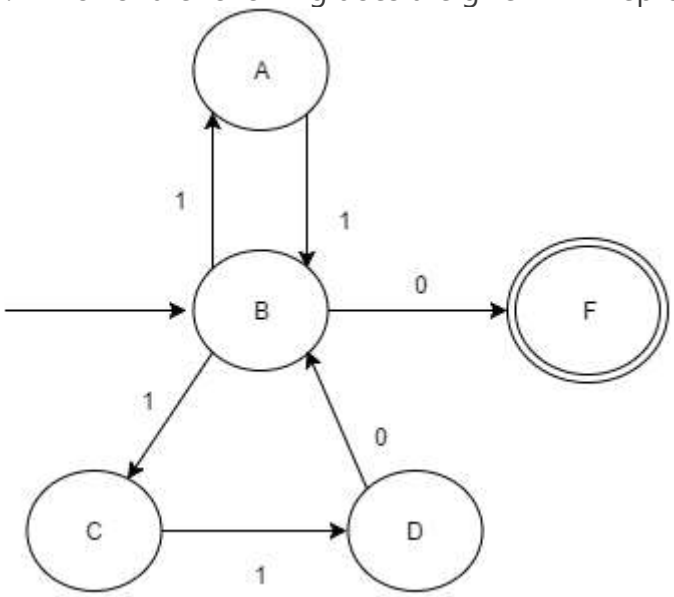
1. Subset Construction method refers to:
a) Conversion of NFA to DFA
b) DFA minimization
c) Eliminating Null references
d) ε-NFA to NFA

Answer: a

2. Given Language:
L_n= {xϵ {0,1} * | |x|≥n, nth symbol from the right in x is 1}
How many state are required to execute L_3 using NFA?
a) 16
b) 15
c) 8
d) 7

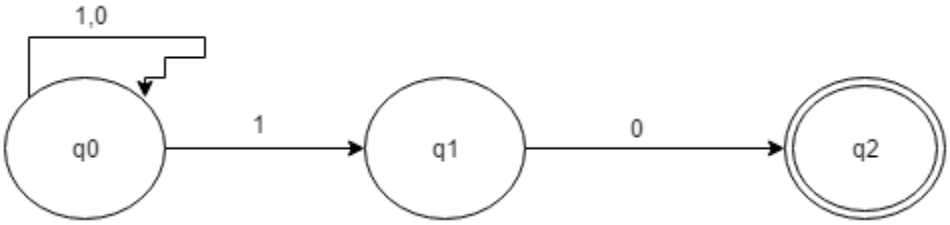
Answer: b

3. Which of the following does the given NFA represent?



a) {11, 101} * {01}
b) {110, 01} * {11}
c) {11, 110} * {0}
d) {00, 110} * {1}
Answer: c

4. The number of transitions required to convert the following into equivalents DFA:



a) 2
b) 3
c) 1
d) 0
Answer: a

5. If L is a regular language, L^c and L^r both will be:
a) Accepted by NFA
b) Rejected by NFA
c) One of them will be accepted
d) Cannot be said
Answer: a

6. In NFA, this very state is like dead-end non final state:
a) ACCEPT
b) REJECT
c) DISTINCT
d) START Answer: b

7. We can represent one language in more one FSMs, true or false?
a) TRUE
b) FALSE
c) May be true
d) Cannot be said
Answer: a

8. The production of form non-terminal -> ε is called:
a) Sigma Production
b) Null Production
c) Epsilon Production
d) All of the mentioned
Answer: b

9. Which of the following is a regular language?
a) String whose length is a sequence of prime numbers
b) String with substring ww^r in between
c) Palindrome string
d) String with even number of Zero's
Answer: d

10. Which of the following recognizes the same formal language as of DFA and NFA?
a) Power set Construction
b) Subset Construction
c) Robin-Scott Construction
d) All of the mentioned
Answer: d

Equivalence of NFA and DFA

1. Under which of the following operation, NFA is not closed?
a) Negation
b) Kleene
c) Concatenation
d) None of the mentioned
Answer: d

2. It is less complex to prove the closure properties over regular languages using
a) NFA
b) DFA
c) PDA
d) Can't be said
Answer: a

3. Which of the following is an application of Finite Automaton?
a) Compiler Design
b) Grammar Parsers
c) Text Search
d) All of the mentioned

Answer: d

4. John is asked to make an automaton which accepts a given string for all the occurrence of ‘1001’ in it. How many number of transitions would John use such that, the string processing application works?
a) 9
b) 11
c) 12
d) 15
Answer: a

5. Which of the following do we use to form an NFA from a regular expression?
a) Subset Construction Method
b) Power Set Construction Method
c) Thompson Construction Method
d) Scott Construction Method
Answer: c

6. Which among the following can be an example of application of finite state machine(FSM)?
a) Communication Link
b) Adder
c) Stack
d) None of the mentioned
Answer: a

7. Which among the following is not an application of FSM?
a) Lexical Analyser
b) BOT
c) State charts
d) None of the mentioned
Answer: d

8. L1= {w | w does not contain the string tr }
   L2 = {w | w does contain the string tr}
   Given ∑ = {t, r}, The difference of the minimum number of states required to form L1 and L2?
   a) 0
   b) 1
   c) 2
   d) Cannot be said
   Answer: a

9. Predict the number of transitions required to automate the following language using only 3 states:
L = {w | w ends with 00}
a) 3
b) 2

c) 4
d) Cannot be said
Answer: a

10. The total number of states to build the given language using DFA:
L = {w | w has exactly 2 a's and at least 2 b's}
a) 10
b) 11
c) 12
d) 13
Answer: a

Applications of DFA

1. Given Language: {x | it is divisible by 3}
The total number of final states to be assumed in order to pass the number constituting {0, 1} is
a) 0
b) 1
c) 2
d) 3
Answer: c

2. A binary string is divisible by 4 if and only if it ends with:
a) 100
b) 1000
c) 1100
d) 0011
Answer: a

3. Let L be a language whose FA consist of 5 acceptance states and 11 non final states. It further consists of a dumping state. Predict the number of acceptance states in L^c.
a) 16
b) 11
c) 5
d) 6
Answer: a

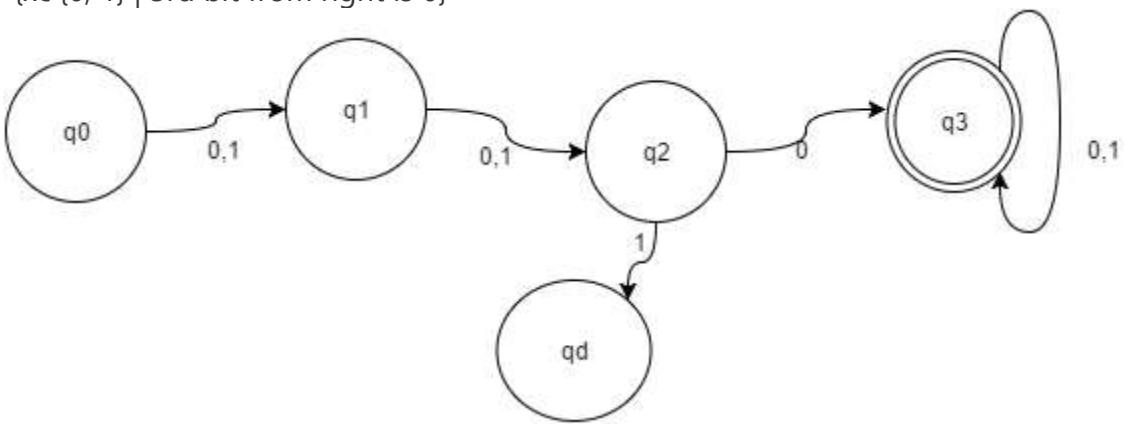
4. If L1 and L2 are regular languages, which among the following is an exception?
a) L1 U L2
b) L1 – L2
c) L1 ∩ L2
d) All of the mentioned Answer: d

5. Predict the analogous operation for the given language:
A: {[p, q] | p ϵ A1, q does not belong to A2}
a) A1-A2

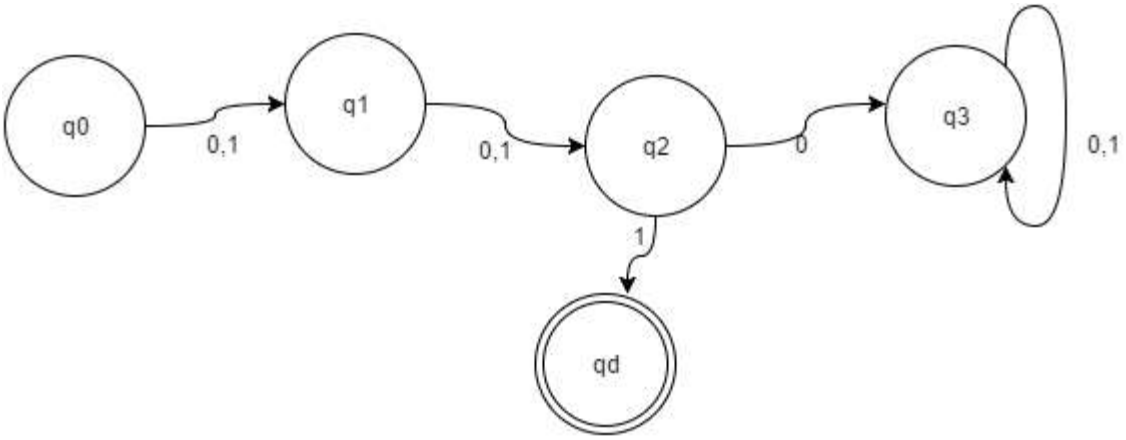
b) A2-A1
c) A1.A2
d) A1+A2
Answer: a

6. Which among the following NFA's is correct corresponding to the given Language?
L= {xϵ {0, 1} | 3rd bit from right is 0}

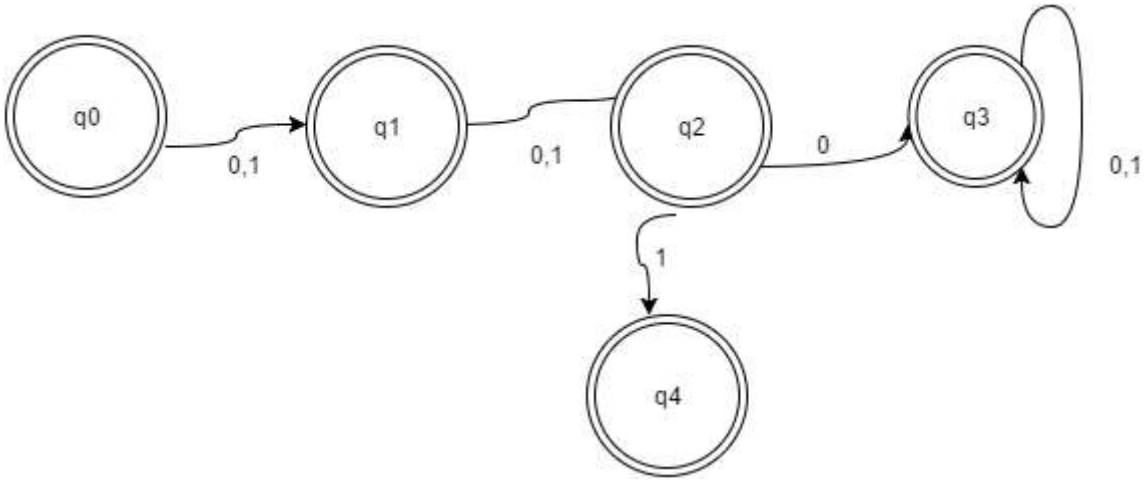
a)



b)



c)



d) None of the mentioned Answer: a

7. Statement 1: NFA computes the string along parallel paths.
Statement 2: An input can be accepted at more than one place in an NFA.
Which among the following options are most appropriate?

a) Statement 1 is true while 2 is not
b) Statement 1 is false while is not
c) Statement 1 and 2, both are true
d) Statement 1 and 2, both are false
Answer: c

8. Which of the following options is correct for the given statement?
Statement: If K is the number of states in NFA, the DFA simulating the same language would have states less than 2^k.
a) True
b) False
Answer: a

9. Let N (Q, ∑, δ, q0, A) be the NFA recognizing a language L. Then for a DFA (Q′, ∑, δ′, q0′, A′), which among the following is true?
a) Q′ = P(Q)
b) Δ′ = δ′ (R, a) = {q ϵ Q | q ϵ δ (r, a), for some r ϵ R}
c) Q′ = {q0}
d) All of the mentioned
Answer: d

10. There exists an initial state, 17 transition states, 7 final states and one dumping state, Predict the maximum number of states in its equivalent DFA?
a) 226
b) 224
c) 225
d) 223
Answer: a

Finite Automata with Epsilon Transition

1. According to the given transitions, which among the following are the epsilon closures of q1 for the given NFA?
Δ (q1, ε) = {q2, q3, q4}
Δ (q4, 1) = q1
Δ (q1, ε) = q1
a) q4
b) q2
c) q1
d) q1, q2, q3, q4
Answer: d

2. State true or false?
Statement: An NFA can be modified to allow transition without input alphabets, along with one or more transitions on input symbols.

a) True
b) False
Answer: a

3. State true or false?
Statement: ε (Input) does not appears on Input tape.
a) True
b) False
Answer: a

4. Statement 1: ε- transition can be called as hidden non-determinism.
Statement 2: δ (q, ε) = p means from q it can jump to p with a shift in read head.
Which among the following options is correct?
a) Statement 1 and 2, both are correct
b) Statement 1 and 2, both are wrong
c) Statement 1 is correct while Statement 2 is wrong
d) Statement 1 is wrong while Statement 2 is correct
Answer: c

5. ε- closure of q1 in the given transition graph:
a) {q1}
b) {q0, q2}
c) {q1, q2}
d) {q0, q1, q2}
Answer: c

6. Predict the total number of final states after removing the ε-moves from the given NFA?
a) 1
b) 2
c) 3
d) 0
Answer: c
7. For NFA with ε-moves, which among the following is correct?
a) Δ: Q X (∑ U {ε}) -> P(Q)
b) Δ: Q X (∑) -> P(Q)
c) Δ: Q X (∑*) -> P(Q)
d) All of the mentioned
Answer: a

8. Which among the following is false?
ε-closure of a subset S of Q is:
a) Every element of S ϵ Q
b) For any q ϵ ε(S), every element of δ (q, ε) is in ε(S)
c) No other element is in ε(S)
d) None of the mentioned
Answer: d

9. The automaton which allows transformation to a new state without consuming any input symbols:
a) NFA
b) DFA
c) NFA-l
d) All of the mentioned
Answer: c

10. e-transitions are
a) conditional
b) unconditional
c) input dependent
d) none of the mentioned
Answer: b

11. The _____ of a set of states, P, of an NFA is defined as the set of states reachable from any state in P following e-transitions.
a) e-closure
b) e-pack
c) Q in the tuple
d) None of the mentioned
Answer: a

12. The e-NFA recognizable languages are not closed under :
a) Union
b) Negation
c) Kleene Closure
d) None of the mentioned
Answer: d

Uses of Epsilon-Transitions

1. The automaton which allows transformation to a new state without consuming any input symbols:
a) NFA
b) DFA
c) NFA-l
d) All of the mentioned
Answer: c

2. e-transitions are
a) conditional
b) unconditional
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3. The _____ of a set of states, P, of an NFA is defined as the set of states reachable from any state in P following e-transitions.
a) e-closure
b) e-pack
c) Q in the tuple
d) None of the mentioned
Answer: a

4. The e-NFA recognizable languages are not closed under _____
a) Union
b) Negation
c) Kleene Closure
d) None of the mentioned
Answer: d

5. Is the language preserved in all the steps while eliminating epsilon transitions from a NFA?
a) yes
b) no
Answer: a

6. An e-NFA is _____ in representation.
a) Quadruple
b) Quintuple
c) Triple
d) None of the mentioned
Answer: b

7. State true or false:
Statement: Both NFA and e-NFA recognize exactly the same languages.
a) true
b) false
Answer: a

Epsilon Closures

1. Which of the following does not belong to input alphabet if S={a, b}* for any language?
a) a
b) b
c) e
d) none of the mentioned

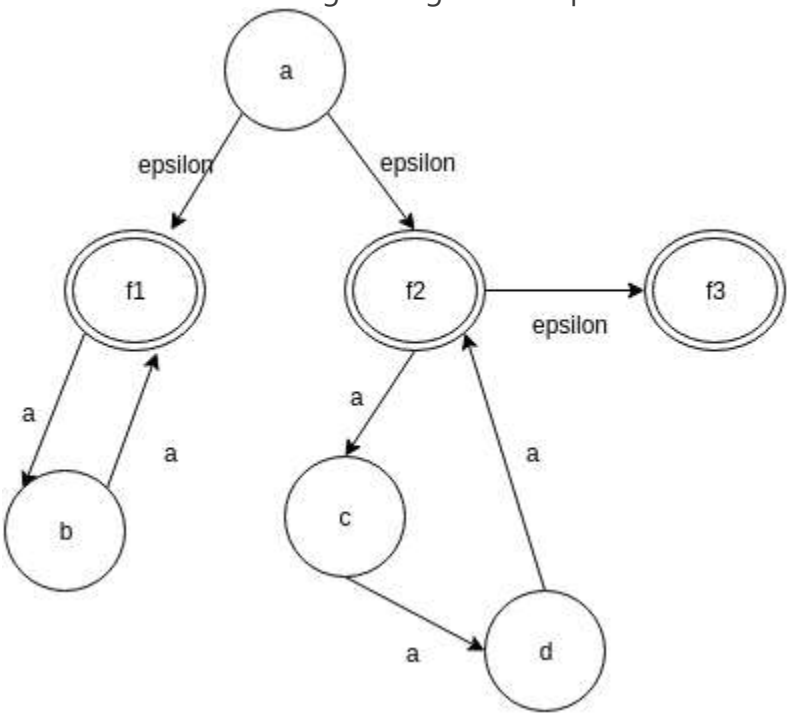
Answer: c

2. The number of final states we need as per the given language?
Language L: {an| n is even or divisible by 3}
a) 1
b) 2
c) 3
d) 4
Answer: b

3. State true or false:
Statement: Both NFA and e-NFA recognize exactly the same languages.
a) true
b) false
Answer: a

4. Design a NFA for the language:
L: {an| n is even or divisible by 3}
Which of the following methods can be used to simulate the same.
a) e-NFA
b) Power Construction Method
c) e-NFA and Power Construction Method
d) None of the mentioned
Answer: c

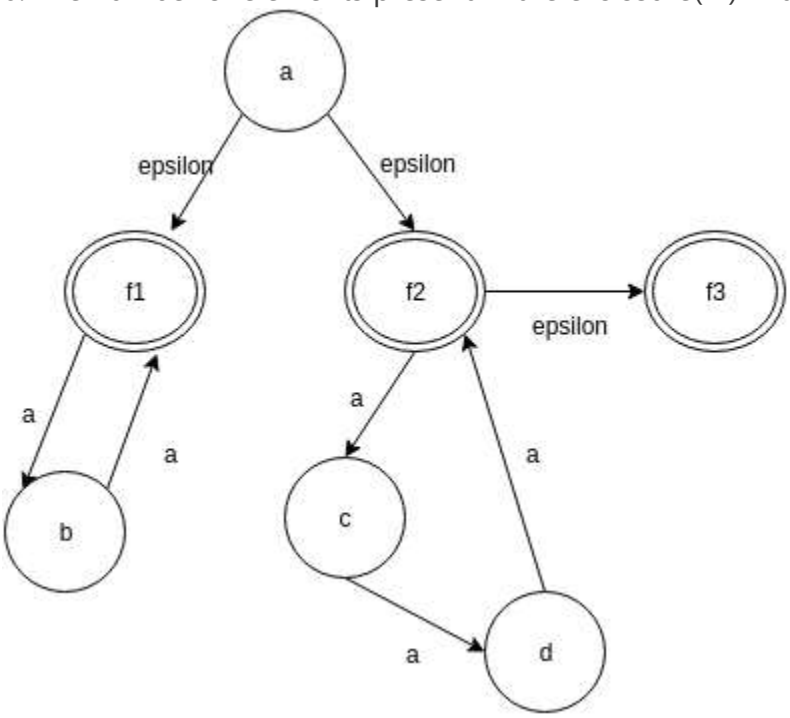
5. Which of the following belongs to the epsilon closure set of a?



a) {f1, f2, f3}
b) {a, f1, f2, f3}
c) {f1, f2}
d) none of the mentioned

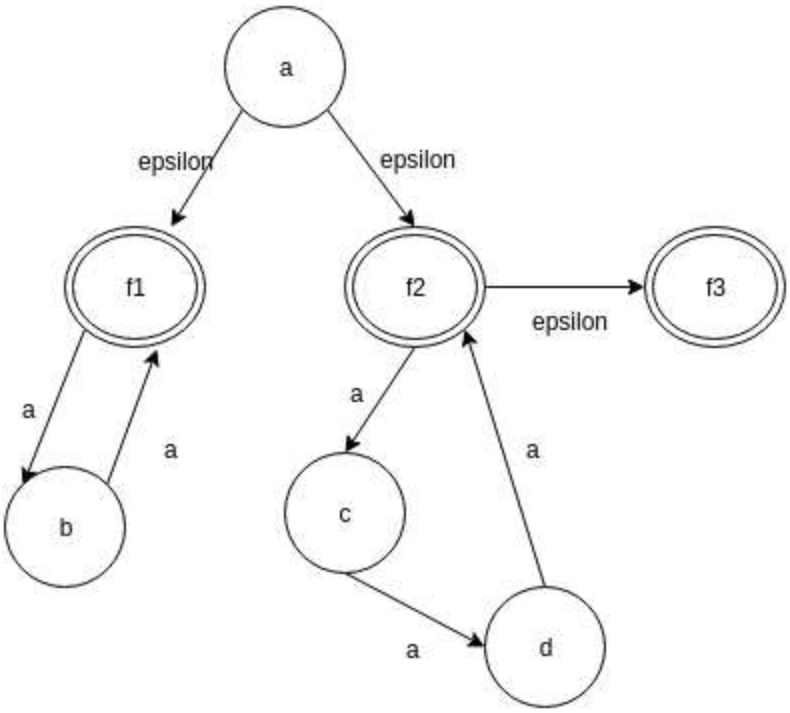
Answer: b

6. The number of elements present in the e-closure(f2) in the given diagram:



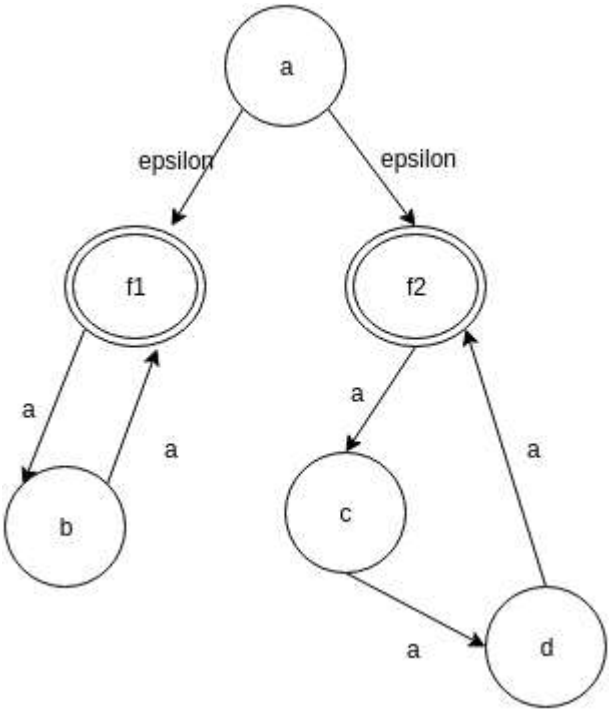
a) 0
b) 1
c) 2
d) 3
Answer: c

7. Which of the steps are non useful while eliminating the e-transitions for the given diagram?



a) Make a as accepting state of N' if ECLOSE(p) contains an accepting state of N
b) Add an arc a to f1 labelled a if there is an arc labelled a in N from some state in ECLOSE(a) to f1
c) Delete all arcs labelled as e
d) None of the mentioned
Answer: d

8. Remove all the epsilon transitions in the given diagram and compute the number of a-transitions in the result?



a) 5
b) 7
c) 9
d) 6
Answer: b

Union, Intersection & Complement

1. Regular sets are closed under union,concatenation and kleene closure.
a) True
b) False
c) Depends on regular set
d) Can't say
Answer:a

2. Complement of a DFA can be obtained by
a) making starting state as final state
b) no trival method
c) making final states non-final and non-final to final
d) make final as a starting state
Answer:c

3. Complement of regular sets are _____
a) Regular
b) CFG
c) CSG
d) RE
Answer:a

4. If L1 and L2 are regular sets then intersection of these two will be
a) Regular
b) Non Regular
c) Recursive
d) Non Recursive
Answer:a

5. If L1 is regular L2 is unknown but L1-L2 is regular ,then L2 must be
a) Empty set
b) CFG
c) Decidable
d) Regular
Answer:d

6. Reverse of a DFA can be formed by
a) using PDA
b) making final state as non-final

c) making final as starting state and starting state as final state
d) None of the mentioned
Answer:c

7. Reverse of (0+1)* will be
a) Phi
b) Null
c) (0+1)*
d) (0+1)
Answer:c

8. A _____ is a substitution such that h(a) contains a string for each a.
a) Closure
b) Interchange
c) Homomorphism
d) Inverse Homomorphism
Answer:c

9. Homomorphism of a regular set is _____
a) Universal set
b) Null set
c) Regular set
d) Non regular set
Answer:c

10. (a ^ 5b ^ 5)* is example of _____
a) Type 0 language
b) Type 1 language
c) Type 2 language
d) Type 3 language
Answer:d

11. Which of the following is type 3 language ?
a) Strings of 0's whose length is perfect square
b) Palindromes string
c) Strings of 0's having length prime number
d) String of odd number of 0's
Answer:d

12. a ^ nb ^ n where (n+m) is even .
a) Type 0

b) Type 1
c) Type 2
d) Type 3
Answer:d

13. Complement of a ^ nb ^ m where n >= 4 and m <= 3 is example of
a) Type 0
b) Type 1
c) Type 2
d) Type 3
Answer:d

14. a ^ nb ^ m where n >= 1, m >= 1, nm >= 3 is example of
a) Type 0
b) Type 1
c) Type 2
d) Type 3
Answer:d

15. Complement of (a + b)* will be
a) phi
b) null
c) a
d) b
Answer:a

Regular Expressions & Languages

Regular Expression-Introduction

1. L is a regular Language if and only If the set of _____ classes of IL is finite.
a) Equivalence
b) Reflexive
c) Myhill
d) Nerode
Answer: a

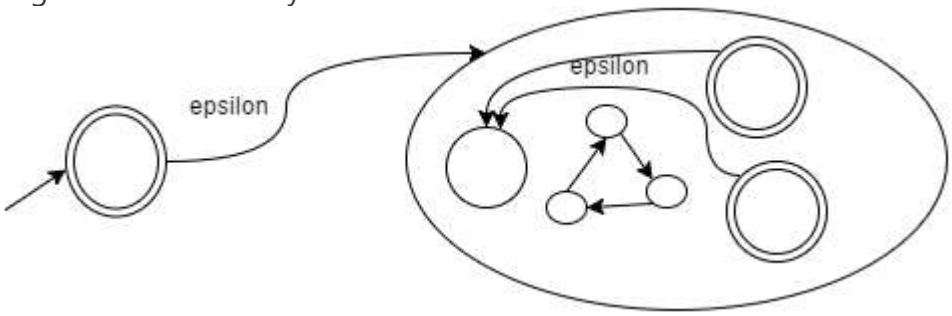
2. A language can be generated from simple primitive language in a simple way if and only if
a) It is recognized by a device of infinite states
b) It takes no auxiliary memory
c) All of the mentioned
d) None of the mentioned
Answer: b

3. Which of the following does not represents the given language?
Language: {0,01}
a) 0+01
b) {0} U {01}
c) {0} U {0}{1}
d) {0} ^ {01}
Answer: d

4. According to the given language, which among the following expressions does it corresponds to?
Language L={xϵ{0,1}|x is of length 4 or less}
a) $(0+1+0+1+0+1+0+1)^4$
b) $(0+1)^4$
c) $(01)^4$
d) $(0+1+\varepsilon)^4$ Answer: d

5. Which among the following looks similar to the given expression?
((0+1). (0+1)) *
a) {xϵ {0,1} *|x is all binary number with even length}
b) {xϵ {0,1} |x is all binary number with even length}
c) {xϵ {0,1} *|x is all binary number with odd length}
d) {xϵ {0,1} |x is all binary number with odd length}
Answer: a

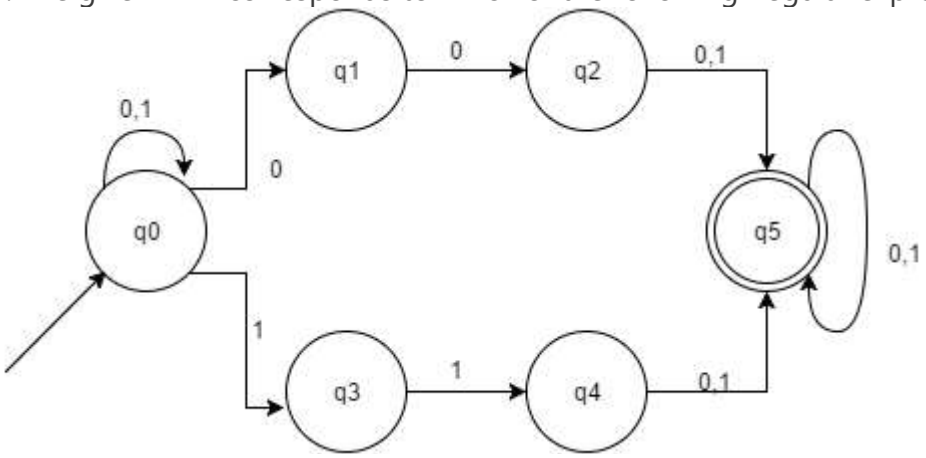
6. If R represents a regular language, which of the following represents the Venn-diagram most correctly?



a) An Irregular Set

b) R*
c) R complement
d) R reverse
Answer: b

7. The given NFA corresponds to which of the following Regular expressions?



a) (0+1) *(00+11) (0+1) *
b) (0+1) *(00+11) *(0+1) *
c) (0+1) *(00+11) (0+1)
d) (0+1) (00+11) (0+1) *
Answer: a

8. Concatenation Operation refers to which of the following set operations:
a) Union
b) Dot
c) Kleene
d) Two of the options are correct
Answer: b

9. Concatenation of R with Φ outputs:
a) R
b) Φ
c) R.Φ
d) None of the mentioned
Answer: b

10. RR* can be expressed in which of the forms:
a) R+
b) R-
c) R+ U R-
d) R
Answer: a

Operators of Regular Expression

1. A finite automaton accepts which type of language:
a) Type 0
b) Type 1
c) Type 2
d) Type 3
Answer: d

2. Which among the following are incorrect regular identities?
a) εR=R
b) ε*=ε
c) Φ*=ε
d) RΦ=R
View Answer
Answer: d

3. Simplify the following regular expression:
ε+1*(011) *(1*(011) *) *
a) (1+011) *
b) (1*(011) *)
c) (1+(011) *) *
d) (1011) *
View Answer
Answer: a

4. P, O, R be regular expression over ∑, P is not ε, then
R=Q + RP has a unique solution:
a) Q*P
b) QP*
c) Q*P*
d) (P*O*) *
View Answer
Answer: b

5. Arden's theorem is true for:
a) More than one initial states
b) Null transitions
c) Non-null transitions
d) None of the mentioned
View Answer
Answer: c

6. The difference between number of states with regular expression (a + b) and (a + b) * is:
a) 1
b) 2
c) 3
d) 0
View Answer
Answer: a

7. In order to represent a regular expression, the first step to create the transition diagram is:
a) Create the NFA using Null moves
b) Null moves are not acceptable, thus should not be used
c) Predict the number of states to be used in order to construct the Regular expression
d) None of the mentioned
View Answer
Answer: a

8. (0+ε) (1+ε) represents
a) {0, 1, 01, ε}
b) {0, 1, ε}
c) {0, 1, 01 ,11, 00, 10, ε}
d) {0, 1}
View Answer
Answer: a

9. The minimum number of states required to automate the following Regular Expression:
(1) *(01+10) (1) *
a) 4
b) 3
c) 2
d) 5
View Answer
Answer: a

10. Regular Expression denote precisely the _____ of Regular Language.
a) Class
b) Power Set
c) Super Set

d) None of the mentioned
View Answer
Answer: a

Building Regular Expressions

1. Which of the following is correct?
Statement 1: ε represents a single string in the set.
Statement 2: Φ represents the language that consist of no string.
a) Statement 1 and 2 both are correct
b) Statement 1 is false but 2 is correct
c) Statement 1 and 2 both are false
d) There is no difference between both the statements, ε and Φ are different notation for same reason
View Answer
Answer: a

2. The appropriate precedence order of operations over a Regular Language is
a) Kleene, Union, Concatenate
b) Kleene, Star, Union
c) Kleene, Dot, Union
d) Star, Union, Dot
View Answer
Answer: c

3. Regular Expression R and the language it describes can be represented as:
a) R, R(L)
b) L(R), R(L)
c) R, L(R)
d) All of the mentioned
View Answer
Answer: c

4. Let for ∑= {0,1} R= (∑∑∑) *, the language of R would be
a) {w | w is a string of odd length}
b) {w | w is a string of length multiple of 3}
c) {w | w is a string of length 3}

d) All of the mentioned
View Answer
Answer: b

5. If ∑= {0,1}, then Φ* will result to:
a) ε
b) Φ
c) ∑
d) None of the mentioned
View Answer
Answer: a

6. The given NFA represents which of the following NFA
a) (ab U a) *
b) (a*b* U a*)
c) (ab U a*)
d) (ab)* U a*
View Answer
Answer: a

7. Which of the following represents a language which has no pair of consecutive 1's if ∑= {0,1}?
a) (0+10)*(1+ε)
b) (0+10)*(1+ε)*
c) (0+101)*(0+ε)
d) (1+010)*(1+ε)
View Answer
Answer: a

8. The finite automata accept the following languages:
a) Context Free Languages
b) Context Sensitive Languages
c) Regular Languages
d) All the mentioned
View Answer
Answer: c

9. (a + b*c) most correctly represents:
a) (a +b) *c

b) (a)+((b)*.c)
c) (a + (b*)).c
d) a+ ((b*).c)
View Answer
Answer: d

10. Which of the following regular expressions represents the set of strings which do not contain a substring ‘rt’ if ∑= {r, t}
a) (rt)*
b) (tr)*
c) (r*t*)
d) (t*r*)
View Answer
Answer: d

11. According to the precedence rules, x-y-z is equivalent to which of the following?
a) (x-y)-z
b) x-(y-z)
c) Both (x-y)-z and x-(y-z)
d) None of the mentioned
View Answer
Answer: a

12. Dot operator in regular expression resembles which of the following?
a) Expressions are juxtaposed
b) Expressions are multiplied
c) Cross operation
d) None of the mentioned
View Answer
Answer: a

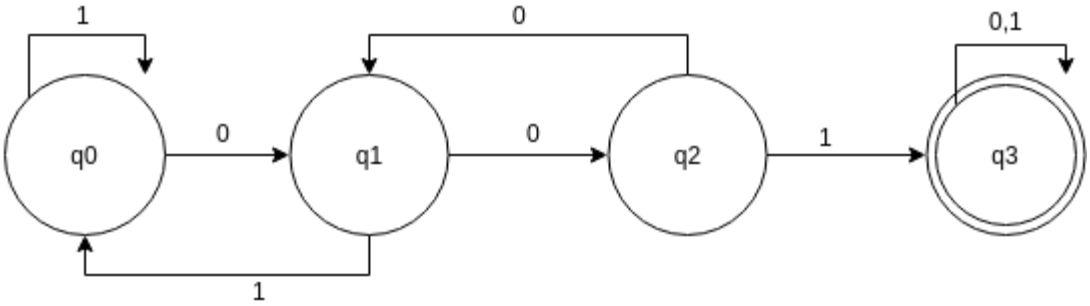
13. Which among the following is not an associative operation?
a) Union
b) Concatenation

c) Dot
d) None of the mentioned
View Answer
Answer: d

14.Which among the following is equivalent to the given regular expression?
01*+1
a) (01)*+1
b) 0((1)*+1)
c) (0(1)*)+1
d) ((0*1)1*)*
View Answer
Answer: c

DFA to Regular Expressions

1. Which of the following is same as the given DFA?



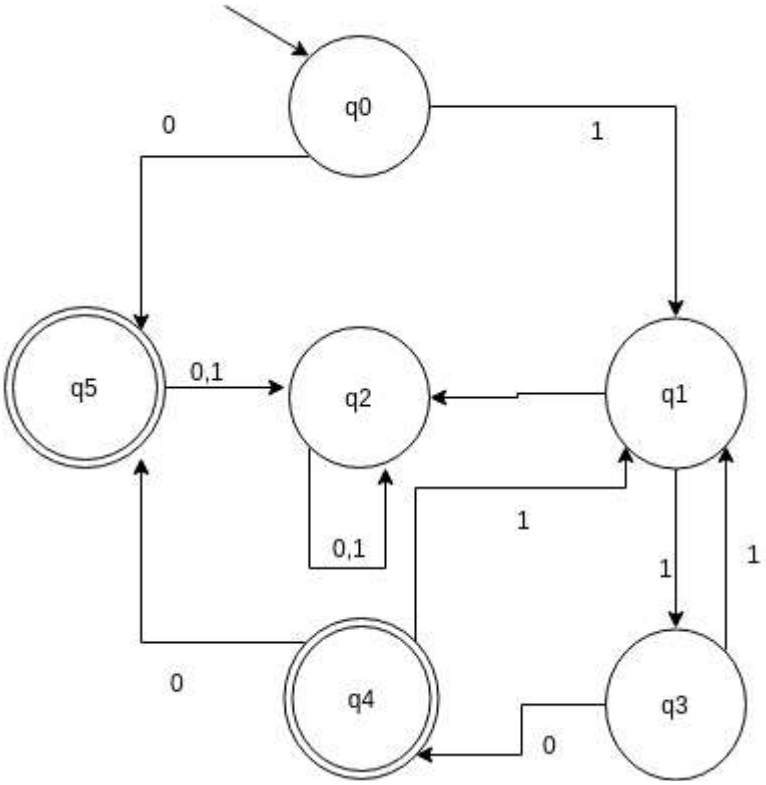
a) (0+1)*001(0+1)*
b) 1*001(0+1)*
c) (01)*(0+0+1)(01)*
d) None of the mentioned
View Answer
Answer: a

2. Which of the following statements is not true?
a) Every language defined by any of the automata is also defined by a regular expression
b) Every language defined by a regular expression can be represented using a DFA
c) Every language defined by a regular expression can be represented using NFA with e moves

d) Regular expression is just another representation for any automata definition
View Answer
Answer: b

3. The total number of states required to automate the given regular expression
(00)*(11)*
a) 3
b) 4
c) 5
d) 6
View Answer
Answer: c

4. Which of the given regular expressions correspond to the automata shown?



a) (110+1)*0
b) (11+110)*1
c) (110+11)*0
d) (1+110)*1
View Answer
Answer: c

5. Generate a regular expression for the following problem statement:
Password Validation: String should be 8-15 characters long. String must contain a number, an Uppercase letter and a Lower case letter.
a) ^(?=.*[a-z])(?=.*[A-Z])(?=.*\d).{8,15}$
b) ^(?=.*[a-z])(?=.*[A-Z])(?=.*\d).{9,16}$
c) ^(?=.[a-z])(?=.[A-Z])(?=.\d).{8,15}$
d) None of the mentioned
View Answer
Answer: a

6. Generate a regular expression for the following problem statement:
P(x): String of length 6 or less for å={0,1}*
a) (1+0+e)6
b) (10)6
c) (1+0)(1+0)(1+0)(1+0)(1+0)(1+0)
d) More than one of the mentioned is correct
View Answer
Answer: a

7. The minimum number of states required in a DFA (along with a dumping state) to check whether the 3rd bit is 1 or not for |n|>=3
a) 3
b) 4
c) 5
d) 1
View Answer
Answer: c

8. Which of the regular expressions corresponds to the given problem statement:
P(x): Express the identifiers in C Programming language
l=letters
d=digits
a) (l+_)(d+_)*
b) (l+d+_)*
c) (l+_)(l+d+_)*

d) (_+d)(l+d+_)*
View Answer
Answer: c

9. Generate a regular expression for the given language:l
L(x): {xÎ{0,1}*| x ends with 1 nd does not contain a substring 01}
a) (0+01)*
b) (0+01)*1
c) (0+01)*(1+01)
d) All of the mentioned
View Answer
Answer: c

10. The minimum number of transitions to pass to reach the final state as per the following regular expression is:
{a,b}*{baaa}
a) 4
b) 5
c) 6
d) 3
View Answer
Answer: a

Conversion by Eliminating states

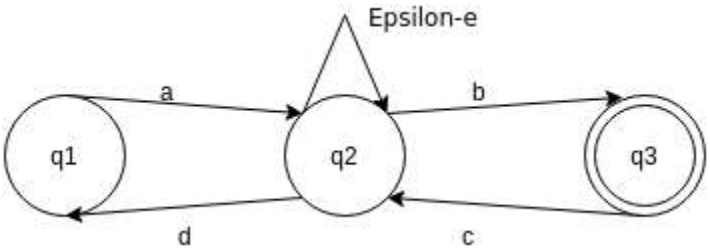
1. Which of the following is an utility of state elimination phenomenon?
a) DFA to NFA
b) NFA to DFA
c) DFA to Regular Expression
d) All of the mentioned
View Answer
Answer: c

2. If we have more than one accepting states or an accepting state with an outdegree, which of the following actions will be taken?
a) addition of new state
b) removal of a state
c) make the newly added state as final

d) more than one option is correct
View Answer
Answer: d

3. Which of the following is not a step in elimination of states procedure?
a) Unifying all the final states into one using e-transitions
b) Unify single transitions to multi transitions that contains union of input
c) Remove states until there is only starting and accepting states
d) Get the resulting regular expression by direct calculation
View Answer
Answer: b

4. Can the given state diagram be reduced?



a) Yes
b) No
View Answer
Answer: a

5. Which of the following methods is suitable for conversion of DFA to RE?
a) Brzozowski method
b) Arden's method
c) Walter's method
d) All of the mentioned
View Answer
Answer: a

6. State true or false:
Statement: The state removal approach identifies patterns within the graph and removes state, building up regular expressions along each transition.
a) true
b) false
View Answer
Answer: a

7. The behaviour of NFA can be simulated using DFA.
a) always
b) never
c) sometimes
d) none of the mentioned
View Answer
Answer: a

8. It is suitable to use _____ method/methods to convert a DFA to regular expression.
a) Transitive Closure properties
b) Brzozowski method
c) State elimination method
d) All of the mentioned
View Answer
Answer: d

9. State true or false:
Statement: For every removed state, there is a regular expression produced.
a) true
b) false
View Answer
Answer: a

10. Is it possible to obtain more than one regular expression from a given DFA using the state elimination method?
a) Yes
b) No
View Answer
Answer: a

Regular Language & Expression – 1

1. A regular language over an alphabet a is one that can be obtained from
a) union
b) concatenation

c) kleene
d) All of the mentioned
View Answer
Answer: d

2. Regular expression {0,1} is equivalent to
a) 0 U 1
b) 0 / 1
c) 0 + 1
d) All of the mentioned
View Answer
Answer: d

3. Precedence of regular expression in decreasing order is
a) * , . , +
b) . , * , +
c) . , + , *
d) + , a , *
View Answer
Answer: a

4. Regular expression Φ* is equivalent to
a) ϵ
b) Φ
c) 0
d) 1
View Answer
Answer: a

5. a? is equivalent to
a) a
b) a+Φ
c) a+ϵ
d) wrong expression
View Answer
Answer: c

6. ϵL is equivalent to
a) ϵ
b) Φ

c) L
d) Φϵ
View Answer
Answer: c

7. (a+b)* is equivalent to
a) b*a*
b) (a*b*)*
c) a*b*
d) none of the mentioned
View Answer
Answer: b

8. ΦL is equivalent to
a) LΦ & Φ
b) Φ & L
c) L & L
d) ϵ & L
View Answer
Answer: a

9. Which of the following pair of regular expression are not equivalent?
a) 1(01)* and (10)*1
b) x(xx)* and (xx)*x
c) (ab)* and a*b*
d) x+ and x*x+
View Answer
Answer: c

10. Consider following regular expression
i) (a/b)* ii) (a*/b*)* iii) ((ϵ/a)b*)*
Which of the following statements is correct
a) i,ii are equal and ii,iii are not
b) i,ii are equal and i,iii are not
c) ii,iii are equal and i,ii are not
d) all are equal
View Answer
Answer: d

Regular Language & Expression – 2

1. How many strings of length less than 4 contains the language described by the regular expression (x+y)*y(a+ab)*?
a) 7
b) 10
c) 12
d) 11
View Answer
Answer: c

2. Which of the following is true?
a) (01)*0 = 0(10)*
b) (0+1)*0(0+1)*1(0+1) = (0+1)*01(0+1)*
c) (0+1)*01(0+1)*+1*0* = (0+1)*
d) All of the mentioned
View Answer
Answer: d

3. A language is regular if and only if
a) accepted by DFA
b) accepted by PDA
c) accepted by LBA
d) accepted by Turing machine
View Answer
Answer: a

4. Regular grammar is
a) context free grammar
b) non context free grammar
c) english grammar
d) none of the mentioned
View Answer
Answer: a

5. Let the class of language accepted by finite state machine be L1 and the class of languages represented by regular expressions be L2 then
a) L1<L2
b) L1>=L2
c) L1 U L2 = .*

d) L1=L2
View Answer
Answer: d

6. Which of the following is not a regular expression?
a) [(a+b)*-(aa+bb)]*
b) [(0+1)-(0b+a1)*(a+b)]*
c) (01+11+10)*
d) (1+2+0)*(1+2)*
Answer: b

7. Regular expression are
a) Type 0 language
b) Type 1 language
c) Type 2 language
d) Type 3 language
View Answer
Answer: d

8. Which of the following is true?
a) Every subset of a regular set is regular
b) Every finite subset of non-regular set is regular
c) The union of two non regular set is not regular
d) Infinite union of finite set is regular
View Answer
Answer: b

9. L and ~L are recursive enumerable then L is
a) Regular
b) Context free
c) Context sensitive
d) Recursive
View Answer
Answer: d

10. Regular expressions are closed under
a) Union
b) Intersection
c) Kleen star
d) All of the mentioned
View Answer

Answer: d

Converting Regular Expressions to Automata

1. What kind of expressions do we used for pattern matching?
a) Regular Expression
b) Rational Expression
c) Regular & Rational Expression
d) None of the mentioned
Answer: c

2. Which of the following do Regexps do not find their use in?
a) search engines
b) word processors
c) sed
d) none of the mentioned
View Answer
Answer: d

3. Which of the following languages have built in regexps support?
a) Perl
b) Java
c) Python
d) C++
View Answer
Answer: a

4. The following is/are an approach to process a regexp:
a) Construction of NFA and subsequently, a DFA
b) Thompson's Contruction Algorithm
c) Thompson's Contruction Algorithm & Construction of NFA and subsequently, a DFA
d) None of the mentioned
View Answer
Answer: c

5. Are the given two patterns equivalent?
(1) gray|grey
(2) gr(a|e)y
a) yes
b) no
View Answer

Answer: a

6. Which of the following are not quantifiers?
a) Kleene plus +
b) Kleene star *
c) Question mark ?
d) None of the mentioned
View Answer
Answer: d

7. Which of the following cannot be used to decide whether and how a given regexp matches a string:
a) NFA to DFA
b) Lazy DFA algorithm
c) Backtracking
d) None of the mentioned
View Answer
Answer: d

10. Conversion of a regular expression into its corresponding NFA :
a) Thompson's Construction Algorithm
b) Powerset Construction
c) Kleene's algorithm
d) None of the mentioned
View Answer
Answer: a

Pumping Lemma for Regular Language

1. Relate the following statement:
Statement: All sufficiently long words in a regular language can have a middle section of words repeated a number of times to produce a new word which also lies within the same language.
a) Turing Machine
b) Pumping Lemma
c) Arden's theorem
d) None of the mentioned
View Answer
Answer: b

2. While applying Pumping lemma over a language, we consider a string w that belong to L and fragment it into _____ parts.

a) 2
b) 5
c) 3
d) 6
View Answer
Answer: c

3. If we select a string w such that w∈L, and w=xyz. Which of the following portions cannot be an empty string?
a) x
b) y
c) z
d) all of the mentioned
View Answer
Answer: b

4. Let w= xyz and y refers to the middle portion and |y|>0.What do we call the process of repeating y 0 or more times before checking that they still belong to the language L or not?
a) Generating
b) Pumping
c) Producing
d) None of the mentioned
View Answer
Answer: b

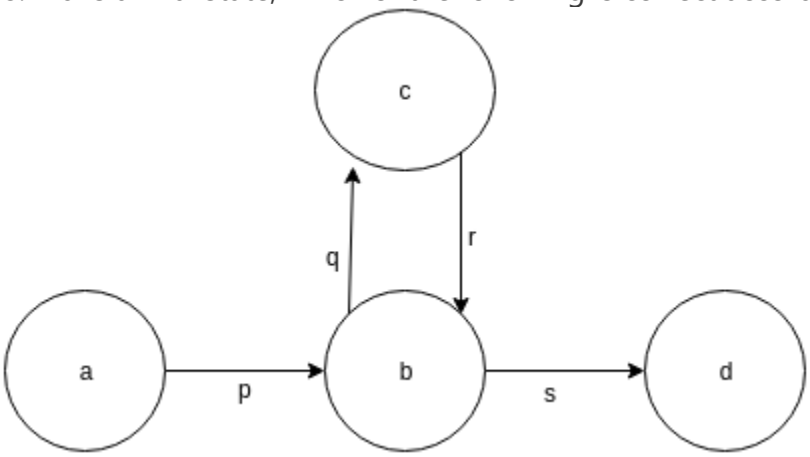
5. There exists a language L. We define a string w such that w∈L and w=xyz and |w| >=n for some constant integer n.What can be the maximum length of the substring xy i.e. |xy|<=?
a) n
b) |y|
c) |x|
d) none of the mentioned
View Answer
Answer: a

6. Fill in the blank in terms of p, where p is the maximum string length in L.
Statement: Finite languages trivially satisfy the pumping lemma by having n = _____
a) p*1

b) p+1
c) p-1
d) None of the mentioned
View Answer
Answer: b

7. Answer in accordance to the third and last statement in pumping lemma:
For all _____ $xy^iz \in L$
a) i>0
b) i<0
c) i<=0
d) i>=0
View Answer
Answer: d

8. If d is a final state, which of the following is correct according to the given diagram?



a) x=p, y=qr, z=s
b) x=p, z=qrs
c) x=pr, y=r, z=s
d) All of the mentioned
View Answer
Answer: a

9. Let w be a string and fragmented by three variable x, y, and z as per pumping lemma. What does these variables represent?
a) string count
b) string
c) string count and string

d) none of the mentioned
View Answer
Answer: a

10. Which of the following one can relate to the given statement:
Statement: If n items are put into m containers, with n>m, then atleast one container must contain more than one item.
a) Pumping lemma
b) Pigeon Hole principle
c) Count principle
d) None of the mentioned
View Answer
Answer: b

3. If we select a string w such that w∈L, and w=xyz. Which of the following portions cannot be an empty string?
a) x
b) y
c) z
d) all of the mentioned
View Answer
Answer: b

4. Let w= xyz and y refers to the middle portion and |y|>0.What do we call the process of repeating y 0 or more times before checking that they still belong to the language L or not?
a) Generating
b) Pumping

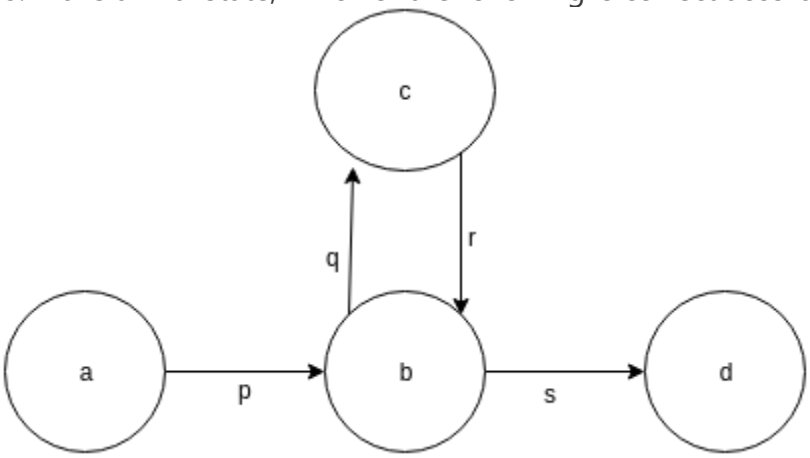
c) Producing
d) None of the mentioned
View Answer
Answer: b

5. There exists a language L. We define a string w such that w∈L and w=xyz and |w| >=n for some constant integer n.What can be the maximum length of the substring xy i.e. |xy|<=?
a) n
b) |y|
c) |x|
d) none of the mentioned
View Answer
Answer: a

6. Fill in the blank in terms of p, where p is the maximum string length in L.
Statement: Finite languages trivially satisfy the pumping lemma by having n = _____
a) p*1
b) p+1
c) p-1
d) None of the mentioned
View Answer
Answer: b

7. Answer in accordance to the third and last statement in pumping lemma:
For all _____ $xy^iz \in L$
a) i>0
b) i<0
c) i<=0
d) i>=0
View Answer
Answer: d

8. If d is a final state, which of the following is correct according to the given diagram?



a) x=p, y=qr, z=s
b) x=p, z=qrs
c) x=pr, y=r, z=s
d) All of the mentioned
View Answer
Answer: a

9. Let w be a string and fragmented by three variable x, y, and z as per pumping lemma. What does these variables represent?
a) string count
b) string
c) string count and string
d) none of the mentioned
View Answer
Answer: a

10. Which of the following one can relate to the given statement:
Statement: If n items are put into m containers, with n>m, then atleast one container must contain more than one item.
a) Pumping lemma
b) Pigeon Hole principle
c) Count principle
d) None of the mentioned
View Answer
Answer: b

Applications of Pumping Lemma/Pigeonhole principle

1. Which kind of proof is used to prove the regularity of a language?
a) Proof by contradiction
b) Direct proof
c) Proof by induction
d) None of the mentioned
View Answer
Answer: a

2. The language of balanced paranthesis is
a) regular
b) non regular
c) may be regular
d) none of the mentioned
View Answer
Answer: b

3. State true or false:
Statement: Pumping lemma gives a necessary but not sufficient condition for a language to be regular.
a) true
b) false
View Answer
Answer: a

4. Which of the following is/are an example of pigeon hole principle?
a) Softball team
b) Sock picking
c) Hair counting
d) All of the mentioned
View Answer
Answer: d

5. Pigeonhole principle can be applied in the following computer science algorithms:
a) hashing algorithm
b) lossless compression algorithm
c) hashing algorithm and lossless compression algorithm
d) none of the mentioned
View Answer
Answer: c

6. If n objects are distributed over m places, and n < m, then some of the places receive:
a) at least 2 objects
b) at most 2 objects
c) no object
d) none of the mentioned
View Answer
Answer: c

7. Which of the following fields may have pigeonhole principle violated?
a) Discrete mathematics
b) Computer Science
c) Quantum Mechanics
d) None of the mentioned
View Answer
Answer: c

8. Which of the following is not an application of Pumping Lemma?
a) $\{0^i1^i|i>=0\}$
b) $\{0^ix|i>=0, x\in\{0, 1\}^*$ and $|x|<=i\}$
c) $\{0^n|$ n is prime$\}$
d) None of the mentioned
View Answer
Answer: d

9. Which of the following can refer a language to be non regular?
a) Pumping Lemma
b) Myphill Nerode
c) Pumping Lemma and Myphill Nerode
d) None of the mentioned
View Answer
Answer: c

10. Which of the following is not an example of counting argument?
a) Pigeonhole principle
b) Dirichlet's drawer principle
c) Dirichlet's box principle
d) None of the mentioned
View Answer
Answer: d

Closure Properties under Boolean Operations

1. If L1, L2 are regular and op(L1, L2) is also regular, then L1 and L2 are said to be _____ under an operation op.
a) open
b) closed
c) decidable
d) none of the mentioned
View Answer
Answer: b

2. Suppose a regular language L is closed under the operation halving, then the result would be:
a) 1/4 L will be regular
b) 1/2 L will be regular
c) 1/8 L will be regular
d) All of the mentioned
View Answer
Answer: d

3. If L1′ and L2′ are regular languages, then L1.L2 will be
a) regular
b) non regular
c) may be regular
d) none of the mentioned
View Answer
Answer: a

4. If L1 and L2′ are regular languages, L1 ∩ (L2′ U L1′)′ will be
a) regular
b) non regular
c) may be regular
d) none of the mentioned
View Answer
Answer: a

5. If A and B are regular languages, !(A′ U B′) is:
a) regular
b) non regular
c) may be regular

d) none of the mentioned
View Answer
Answer: a

6. Which among the following are the boolean operations that under which regular languages are closed?
a) Union
b) Intersection
c) Complement
d) All of the mentioned
View Answer
Answer: d

7. Suppose a language L1 has 2 states and L2 has 2 states. After using the cross product construction method, we have a machine M that accepts L1 ∩ L2. The total number of states in M:
a) 6
b) 4
c) 2
d) 8
View Answer
Answer: b

8. If L is a regular language, then (L')' U L will be :
a) L
b) L'
c) f
d) none of the mentioned
View Answer
Answer: a

9. If L is a regular language, then (((L')r)')* is:
a) regular
b) non regular
c) may be regular

d) none of the mentioned
View Answer
Answer: a

10. Which among the following is the closure property of a regular language?
a) Emptiness
b) Universality
c) Membership
d) None of the mentioned
View Answer
Answer: d