Number of questions by type:

MA: 3

FB: 5

MD: 2

MC: 4

M: 2

1. （MA）In a nondeterministic FSM(NFSM) M (Q, S, F, δ), which one below is correct? (It can be more than one answer is correct) BCD
2. In a NFSM, it`s start state is an infinite set.
3. In the NFSM M, Q, S, F they all are sets.
4. In M, δ always returns a subset of the power set of Q. ( δ : P(Q))
5. For every NFSM M, there is always a FSM M` that L(M)=L(M`)
6. （FB）Given ∑= {1,0}, construct the regular expression that for all strings which start with “11” and end with “11” (11) (0+1) \*(11)
7. (MC) which language below can be generated by context free grammar G: S →xSx|y? A

A. xyx

B. (xyx)\*

1. xnyxn(n ≥0)
2. x\*yx\*
3. (MC) Given a fsm in the picture:

Diagram

Description automatically generated

Which one below is the correct one for the linear equation of state X? A

1. X= (a+ba\*b) \*(ba\*)
2. X= (a\*+ba\*b) (ba\*)
3. X = (a+bab) \*(b+a\*)
4. X= (a+b) \*(a\*+b)
5. (FB) Given machine M (Q, S, F, δ), For building a Kleene Star FSM M1\* (Q1, S1, F1, δ1) for M, what will be the start state for M1\*? 〖〗
6. （MD）Given ∑= {1,0}, match the regular expression to the strings that can be generated by them. (01+1) \*(00) \*(10+1) \*01001, (00+01+10+11) \*, 101101
   * + - 01001
       - 101101
       - 00001
       - 10011
7. (MA) For all the statements below, which one is correct? (It can be more than one answer is correct) B,D
8. A regular expression r is unitary if 〖r〗=0.
9. A regular expression r is bypassable if 1 ⊆〖r〗.
10. A kleene star of a regular expression is always infinite.
11. For left quotient of a regular expression (\), s\0 =0 is always true where s ∈ Σ.

1. (MC) Given ∑={‘c’,’d’}. M is a finite state machine that defined as ([0,1,2,3],0, [0,1,2],δ) where

δ (0,’c’) =1 δ (1,’c’) =2 δ (2,’c’) =2 δ (3,’c’) =3

δ (0,’d’) =0 δ (1,’d’) =0 δ (2,’d’) =3 δ (3,’d’) =3

In these strings below, which one will be accepted by machine M: A

A. cdd

B. ccdd

C. dccd

D. ccd

1. (FB) Given a context free grammar G(s):

S → dAB

A → aA|a

B → Bb|↋

What language does G(s) generate? da+b\*

1. (MD) A regular expression RE can be converted to FSM by using UnionFSM, CatFSM construction, Also, RE can be converted to NFSM by using ClushKov construction, furthermore, FSM can be converted to RE by using SPLEs construction.

* SPLEs
* UnionFSM, CatFSM
* GlushKov
* Brzozowski

1. (MC) Given a NFSM with epsilon moves in the picture, which one below is the result

of ↋-closure(E)? B

Diagram

Description automatically generated

1. {B, C, D, E}
2. {B, C, E}
3. {B, C, E, F}
4. {B, C, D, E, F}
5. (MA) For which set/sets below generates not regular language: (There might be more than one correct answer) A
6. {0n1n |n ≥ 0}
7. {aib |i>=0}
8. {aibj | i,j ∈ N}
9. {ambm+ncn |n, m∈ N}
10. (M) For left quotients on regular expression, given letter and regular expressions r1, r2.

What will be the result for these expressions?

a\(r1r2) (r1 is bypass able) 0

a\0 1

a\b (a\r1) r2

a\(r1r2) (r1 is not bypass able) (a\r1) r2+a\r2

(a\r1)+ a\r2

(a\r1)+r2

1. (FB) For NFSM M that showing in the picture. After minimized M, we get machine M’. How many states does M’ have? 4

Diagram

Description automatically generated

1. (M)Match following regular expressions to the corresponding strings that can be generated by them:

(b(a+b)\*b+a(a+b)\* a) baabbbbab

(a+b)\*a(a+b)(a+b) bbaaba

(b\*ab\*a)\*b\* abbababab

(a+ba)\*bb\*(a+ab) bbabaa

bbabbaa

abbaaabba

1. (FB) Given a context free grammar G(S):

S → aAb----------print (“1”)

S → a ------------ print (“2”)

A → AS ----------- print (“3”)

A → c ------------ print (“4”)

What will be the output if “acab” is the input? 4231