Feedback — Quiz #1

Help

You submitted this quiz on **Fri 4 Apr 2014 10:11 PM PDT**. You got a score of **12.00** out of **12.00**.

Question 1

How many distinct strings are in the language of the regular expression:

$(0+1+\epsilon)(0+1+\epsilon)(0+1+\epsilon)(0+1+\epsilon)$

?

Your Answer		Score	Explanation
12			
31	✔	1.00	
64			
81			
16			
32			
Total		1.00 / 1.00	

Question Explanation

We have 16 distinct strings of length 4, 8 distinct strings of length 3, 4 distinct strings of length 2, 2 distinct strings of length 1, and one empty string. In total, we have 16+8+4+2+1=31 distinct strings.

Question 2

Consider the string $abbbaacc$. Which of the following lexical specifications produces the tokenization $ab \mid bb \mid a \mid acc$?

[Check all that apply]

Your Answer		Score	Explanation
☑ ab b+ ac*	✔	0.25	
☑ c* b+ ab ac*	✔	0.25	
☐ b+ ab* ac*	✔	0.25	The string will be tokenized as $abbb \mid a \mid acc$.
☑ a(b + c*) b+	✔	0.25	
Total		1.00 / 1.00	

Question 3

Using the lexical specification below, how is the string "dictatorial" tokenized?

dict (1)
dictator (2)
[a-z]* (3)
dictatorial (4)

Your Answer		Score	Explanation
○ 2, 3			
○ 4			
◉ 3	✔	1.00	
○ 1, 3			
Total		1.00 / 1.00	

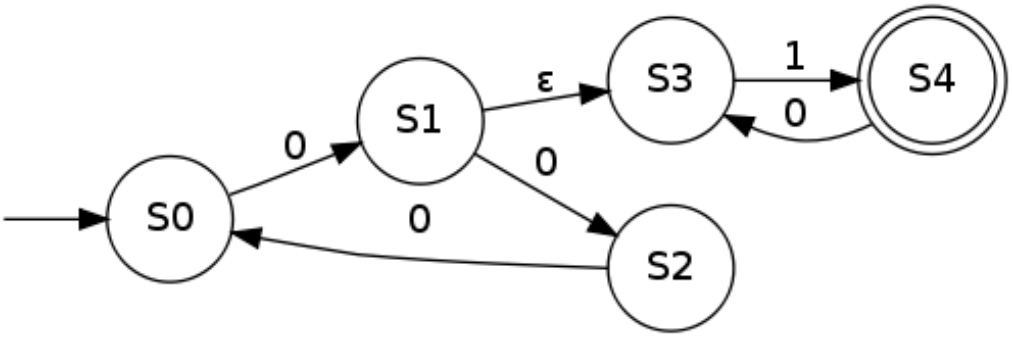
Question Explanation

Both rule 3 and 4 match the whole string, while 3 has a higher priority.

Question 4

Which of the following regular expressions generate the same language as the one recognized by this NFA?

[Check all that apply]



Your Answer		Score	Explanation
☐ 0(000)*(01)*	✔	0.20	
☐ 0(00)*(10)*	✔	0.20	
☑ (000)*(01)+	✔	0.20	
☐ (000)*(10)+	✔	0.20	
☑ 0(000)*1(01)*	✔	0.20	
Total		1.00 / 1.00	

Question Explanation

In this NFA, there are five states, S0, S1, S2, S3 and S4. S0 is the start state, S4 is the accepting state. The transactions are following.
If we are in state S0 and read input 0, we go to S1.
If we are in state S1, we can go to state S3 without consuming any input, that is a ϵ-move. If we are in state S1 and read 0, we go to S2.
If we are in state S2 and read 0, we go to S0.
If we are in state S3 and read 1, we go to S4.
If we are in S4 and read 0, we go to S3.

Question 5

Let S_i be the string consisting of i 0's follwed by $2i$ 1's. Define the language $L_n = \{S_i | 1 \leq i \leq n\}$. For example,

$$L_3 = \{\, 011,\ 001111,\ 000111111 \,\}.$$

For any given n, what is the smallest number of states needed for a DFA that recognizes L_n?

Your Answer		Score	Explanation
$n^2 + 2n - 2$			
$3(n+1)$			
$3n + 1$	✔	1.00	
$2n$			
$3n + 2$			
$3n$			
Total		1.00 / 1.00	

Question Explanation

We need states to count how many 0 we meet and how many 1 we meet, so we need 3*n+1 states including the start state.

Question 6

The language of the regular expresion *(abab)** is equivalent to the language of which of the following regular expressions?

[Check all that apply]

Your Answer		Score	Explanation
☑ $(aba\,(baba)^*\,b) + \epsilon$	✔	0.25	

☐ $(a\,(ba)^*\,b) + \epsilon$	✔	0.25	This language contains "ab", which is not in the language of regular expression *(abab)**.
☐ $(ab)^*$	✔	0.25	This language contains "ab", which is not in the language of regular expression *(abab)**.
☑ $(ab\,(abab)^*\,ab) + \epsilon$	✔	0.25	
Total		1.00 / 1.00	

Question 7

What is the minimum number of states a DFA recognizing the language of $a(bc)^*d$ can have?

Your Answer		Score	Explanation
○ 8			
◉ 4	✔	1.00	
○ 3			
○ 6			
Total		1.00 / 1.00	

Question Explanation

We need 4 states, S1, S2, S3 and S4. S1 is start state and S4 is the accepting state.
If we are in S1 and read input a, we go to S2.
If we are in S2 and read input b, we go to S3. If we are in S2 and read d, we go to S4.
If we are in S3 and read c, we go to S2.

Question 8

Given the following lexical specification:

a(ba)*

b*(ab)*
abd
d+

Which of the following statements is true?

[Check all that apply]

Your Answer		Score	Explanation
☐ $dddabbabab$ will be tokenized as: $ddd \mid a \mid bbabab$	✔	0.25	$dddabbabab$ will be tokenized as: $ddd \mid ab \mid babab$
☑ $ababdddd$ will be tokenized as: $abab \mid dddd$	✔	0.25	
☑ $babad$ will be tokenized as: $bab \mid a \mid d$	✔	0.25	
☐ $ababddababa$ will be tokenized as: $ab \mid abd \mid d \mid ababa$	✔	0.25	$ababddababa$ will be tokenized as: $abab \mid dd \mid ababa$
Total		1.00 / 1.00	

Question 9

Given the following lexical specification:

(00)*
01+
10+

Which strings are NOT successfully processed by this specification?

[Check all that apply]

Your Answer		Score	Explanation
☑ 01100110	✔	0.25	
☑ 0111110	✔	0.25	
☐ 0001101	✔	0.25	The string will be tokenized as 00/011/01.

01100100	✔	0.25	The string will be tokenized as 011/00/100.
Total		1.00 / 1.00	

Question 10

For any language L, the *complement* of the language (usually written L') is defined as the language
that consists of all the strings that are NOT in L. That is,

$$L' = \Sigma^* - L$$

It turns out that the complement of any regular language is also a regular language.

Which of the following regular expressions define a language that is the complement of the language defined by the
regular expression: $1(01)^*$?
[Check all that apply]

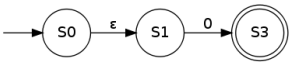
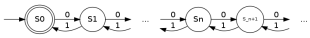
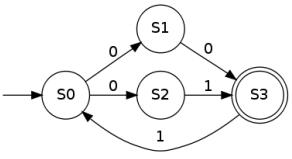
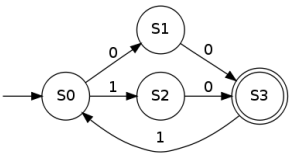
Your Answer		Score	Explanation
$(0+\epsilon)\big((1+\epsilon)(0+\epsilon)\big)^*$	✔	0.25	"11" is not in this language or the language of $1(01)^*$.
$(10)^*$	✔	0.25	"11" is not in this language or the language of $1(01)^*$.
$\epsilon + (0(0+1)^*) + ((0+1)^*0) + \big((0+1)^*(00+11)(0+1)^*\big)$	✔	0.25	
$(10)^* + ((10)^*0(0+1)^*) + (1(01)^*1(0+1)^*)$	✔	0.25	

Total	1.00 / 1.00

Question 11

Which of the following automata are DFAs?

[Check all that apply]

Your Answer		Score	Explanation
☐ 	✔	0.25	This automata has 3 states, S0, S1 and S3. S0 is the start state, S3 is the accepting state. The transactions are following: If we are in S0, we go to S1 with out consuming any input, that is an ϵ-move. If we are in S1 and read 0, we go to S3.
☐ 	✔	0.25	This automata has a state Si for every non-negative integer i: S0, S1... Sn, and so on. S0 is the start state and the accepting state. The transitions are following: If we are in state Si, (i>=0) and read 0, we go to state Si+1. If we are in state Si, (i>=1) and read 1, we go to state Si-1.
☐ 	✔	0.25	This automata has 4 states, S0, S1, S2 and S3. S0 is the start state, S3 is the accepting state. The Transactions are following: If we are in S0 and read 0, we can go to S1. If we are in S0 and read 0, we can go to S2. If we are in S1 and read 0, we go to S3. If we are in S2 and read 1, we go to S3. If we are in S3 and read 1, we go to S0.
☑ 	✔	0.25	This automata has 4 states, S0, S1, S2 and S3. S0 is the start state, S3 is the accepting state. The Transactions are following: If we are in S0 and read 0, we go to S1. If we are in S0 and read 1, we go to S2. If we are in S1 and read 0, we go to S3.

If we are in S2 and read 0, we go to S3.
If we are in S3 and read 1, we go to S0.

Total	1.00 / 1.00

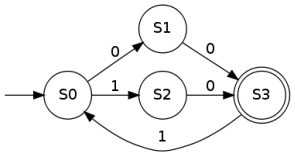
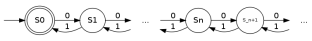
Question Explanation

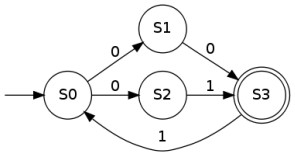
DFAs must have finite states, no ϵ-moves, and one transition per input per state.

Question 12

Which of the following automata are NFAs?

[Check all that apply]

Your Answer		Score	Explanation
☑		✔ 0.25	This automata has 4 states, S0, S1, S2 and S3. S0 is the start state, S3 is the accepting state. The Transactions are following: If we are in S0 and read 0, we go to S1. If we are in S0 and read 1, we go to S2. If we are in S1 and read 0, we go to S3. If we are in S2 and read 0, we go to S3. If we are in S3 and read 1, we go to S0.
☑		✔ 0.25	This automata has 3 states, S0, S1 and S3. S0 is the start state, S3 is the accepting state. The transactions are following: If we are in S0, we go to S1 with out consuming any input, that is an ϵ-move. If we are in S1 and read 0, we go to S3.
☐		✔ 0.25	This automata has a state Si for every non-negative integer i: S0, S1... Sn, and so on. S0 is the start state and the accepting state. The transitions are following: If we are in state Si, (i>=0) and read 0, we go to state Si+1. If we are in state Si, (i>=1) and read 1, we go to state Si-1.
☑		✔ 0.25	This automata has 4 states, S0, S1, S2 and S3. S0



is the start state, S3 is the accepting state. The Transactions are following:
If we are in S0 and read 0, we can go to S1. If we are in S0 and read 0, we can go to S2.
If we are in S1 and read 0, we go to S3.
If we are in S2 and read 1, we go to S3.
If we are in S3 and read 1, we go to S0.

Total	1.00 / 1.00

Question Explanation

NFAs must have finite states.