Homework 5

Started: Apr 3 at 4:23pm

Quiz Instructions

Although this is called a quiz by Canvas, it is just a part of your homework.

This work is untimed and you can retake it as many times as you want. Each time you submit, Canvas will show you your score.

You may collaborate with *one or two* other students on this homework if you wish, or work alone. Collaboration must be true collaboration however, which means that the work put into each problem should be roughly equal and all parties should come away understanding the solution.

There is also ungraded homework that you should do: https://krovetz.net/135/module_reg/hw2.html

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Question 1

2 pts

Open a new browser window to the FA simulator we have been using in class (http://ivanzuzak.info/noam/webapps/fsm_simulator) and paste the following nondeterministic finite automata (NFA).

```
#states
a
b
c
d
#initial
a
#accepting
d
#alphabet
0
1
#transitions
a:0>a
a:1>a
a:1>b
b:1>c
c:0>d
c:1>d
```

Follow the NFA to DFA algorithm learned in class to convert it to a deterministic finite automata (DFA). Use the labeling convention seen in class where each DFA label indicates which states the NFA could be in and the letters are written in increasing order (eg, abc would indicate the NFA could be in state a, b or c). Answer the following questions. (Type only lower-case letters; no punctuation or spaces.)

How many states are in your DFA?

How many accept states are in your DFA?

When in state ad what state do you go to when consuming a 0?

When in state ad what state do you go to when consuming a 1?

When in state abcd what state do you go to when consuming a 0?

When in state abcd what state do you go to when consuming a 1?

Question 2

1.5 pts

In class we learned an algorithm for converting a regular expression into a NFA. Apply the conversion algorithm to the regular expression (ab)* and answer the following questions about the resulting NFA. Type a single digit for each answer.

How many states are in your NFA?

How many arrows are labeled lambda?

How many arrows point at your accept state?

Question 3

1.5 pts

In class we learned an algorithm for converting a regular expression into a NFA. Apply the conversion algorithm to the regular expression (a*b)* and answer the following questions about the resulting NFA. Type a single digit for each answer.

How many states are in your NFA?

How many arrows are labeled lambda?

How many arrows point at your accept state?

Question 4

1 pts

While performing the DFA to RE algorithm learned in class, let's say the following NFA is created as an intermediate step. (You may view the NFA at http://ivanzuzak.info/noam/webapps/fsm_simulator/ (http://ivanzuzak.info/noam/webapps/fsm_simulator/) if you wish). Note that $ is a lambda transition in this text representation.

```
#states
A
B
C
D
E
#initial
A
#accepting
E
#alphabet
0
1
#transitions
A:$>B
B:0>C
C:1>C
C:0>D
D:$>E
```

If State C is removed next, a single transition from B to D results, what will be the label on the transition from B to D? Write your answer without any spaces or

parentheses.

Question 5 — 1 pts

While performing the DFA to RE algorithm learned in class, let's say the following NFA is created as an intermediate step. (You may view the NFA at http://ivanzuzak.info/noam/webapps/fsm_simulator/ (http://ivanzuzak.info/noam/webapps/fsm_simulator/) if you wish). Note that $ is a lambda transition in this text representation.

```
#states
A
B
C
D
E
#initial
A
#accepting
E
#alphabet
0
1
#transitions
A:$>B
B:0>C
C:1>C
C:0>D
B:1>D
D:$>E
```

If State C is removed next, a single transition from B to D results, what will be the label on the transition from B to D? Write your answer without any spaces or parentheses.

Question 6 — 1 pts

While performing the DFA to RE algorithm learned in class, let's say the following NFA is created as an intermediate step. (You may view the NFA at http://ivanzuzak.info/noam/webapps/fsm_simulator/ (http://ivanzuzak.info/noam/webapps/fsm_simulator/) if you wish). Note that $ is a lambda transition in this text representation.

```
#states
A
B
C
D
E
#initial
A
#accepting
E
#alphabet
0
1
#transitions
A:$>B
B:0>C
C:1>B
C:1>C
C:0>D
D:1>C
D:$>E
```

If State C is removed next, what are the labels on each of the following transitions? Write your answer without any spaces or parentheses. If no such transition exists, write exactly the word "none".

B to D:

D to B:

B to B:

D to D:

Question 7

1 pts

Consider the language L = $\{a^i b^j c^k \mid i+k = j\}$. In a proof that L is not regular, you would assume L is regular, with pumping length p. Which of the following could you apply the Pumping Lemma to. Check all that apply.
Note: I am not asking which would lead to a successful proof, just which qualify for applying the Pumping Lemma.

- [ ] aaabbbbc
- [ ] $a^p b^p$
- [ ] $b^p c^p$
- [ ] $a^p b^p c^p$
- [ ] $a^{p/2} b^p c^{p/2}$
- [ ] $a^p b^{2p} c^p$

Question 8

1 pts

Consider the language L = $\{a^i b^j c^k \mid i+k = j\}$. In a proof that L is not regular, you would assume L is regular, with pumping length p and then choose a string that causes problems when pumped. Some of the following are designed to make the task easy. Place a check next to each that allows a relatively easy argument.

- [ ] aaabbbbc
- [ ] $a^p b^p$
- [ ] $b^p c^p$
- [ ] $a^p b^p c^p$
- [ ] $a^{p/2} b^p c^{p/2}$
- [ ] $a^p b^{2p} c^p$

No new data to save. Last checked at 4:24pm Submit Quiz