Zechun Cao 0827 053

COSC 3340

Examination 1

Monday, February 16, 2009, 1 - 2:25 pm

Open Book and Notes

 ${f 1}$. Construct a dfa for the following nfa, using the subset construction given in class:

	 a	<u>b</u> _	С	_
1			3	
$\rightarrow 2$	3	2	1,4	1
3	4	1	2	1
4	1	4	/	1

- $oldsymbol{2}$. Consider the class REG $_{\!\scriptscriptstyle A}$ of all regular languages over the fixed one-letter alphabet $A=\{a\}.$
 - (a) Is REG_A countable?
 - (b) Is the class NOTREG_A of all languages over A that are not regular countable? (Note that NOTREG_A = 2^{A*} REG_A.)
 - (c) Is the class $REG_A \cap NOTREG_A$ countable?

For each question, you must give a precise argument substantiating your answer.

3. Construct an nfa for each of the following regular expressions, then find the corresponding dfa, and then reduce this dfa, always using the constructions given in class:

- $(a \cup a^2) (a^3 \cup a^2)^*$ over the alphabet $\{a\}$ (a)
- $(00 \cup 11)^* ((11)^* \cup (00)^*)$ over the alphabet $\{0.1\}$ (b)

4. Construct a regular expression over the alphabet {a,b} for the language accepted by the following automaton:

	` `		
	a	b	
.→)A.	1	С	(1)
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\mathbf{C}	1	B.C	0

Points:

1:12

2: 22

3: 44

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4: 22

Zechun Cao 0827053

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(a)	REGA is an regular language if it is accepted
	REGA is an regular language if it is accepted by a DFA, and we know is finite automata.

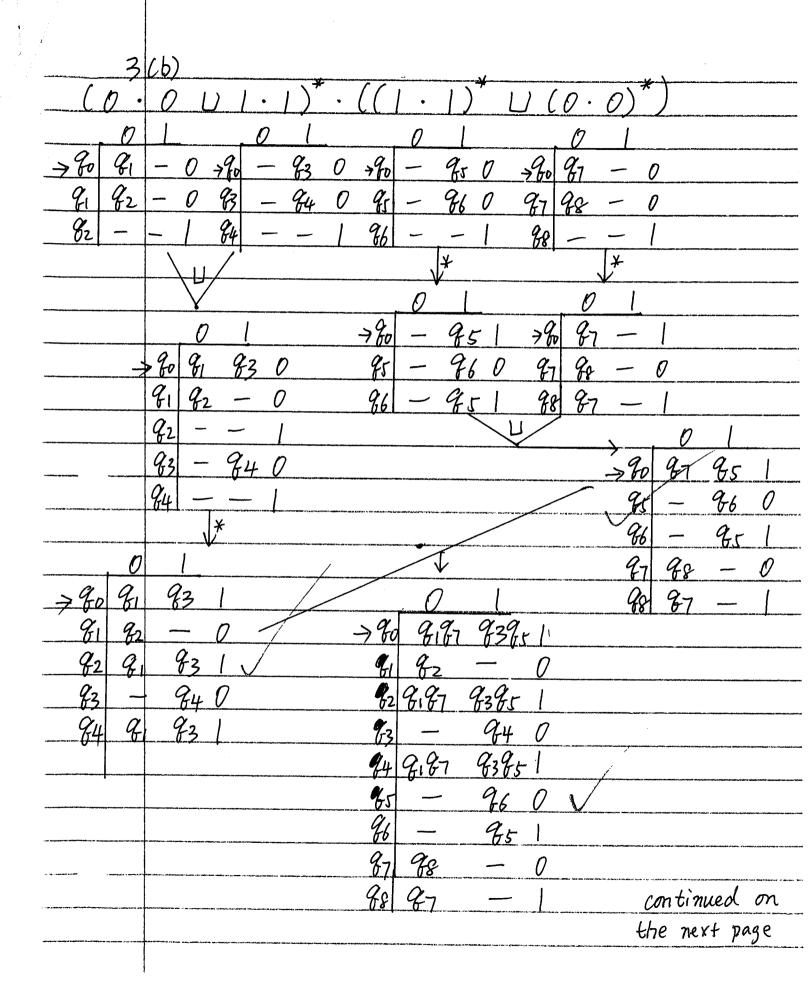
	If we have a DFA over fixed alphabeta A= {a} which are m in number and DFA has n states.
	which are m in number and DFA has n states.
	Then, go to number of combination possible for DFA is 2 ⁿ ·n ^{mn}
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	which is countable
	" REGA is finite as regular language which is
P - 9 7 100	determined by using LFA.
	determined by using LFA. REGA is coupetable.
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	REGA is finite 22
	2A DECA : AND
	· 2 ^A - REGA is infinite
and the second of the second of the second of the second	" NOTREGA is uncountable
(c)	
<u>.</u>	REGANNOTREGA SOY
	: It is countable.
	or us continue.

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	3(a) continued
	Corresponding DFA
4	α
A	$\Rightarrow 0$ 1,2 0 $\Rightarrow A$ B 0
B	1,2 3,4,7 B C 1
<u>C</u>	3,4,7 4,5,7,8 Rename C D 1
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3(b) continued Reduced

$$\begin{cases}
\angle A = b \cdot \angle C \cup \mathcal{E} \\
\angle B = a \cdot \angle A
\end{cases}$$

$$\angle C = b \cdot \angle B \cup b \cdot \angle C$$

$$A \cup A \cup A \cup A$$

$$\angle C = b \cdot A$$

$$C = b \cdot A$$