

Midterm



MONDAY, 7 MARCH 2022
10:30–11:20 AM

There are 5 questions, each worth 6 points for a total of 30 points. No notes, no collaboration, and uphold the integrity of the examination process. Sign your name and show agreement with these instructions.

Name: _____

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1. Give a DFA for the language,

{ x does not contain the substring 101 }

You must draw a diagram of the DFA, making sure to indicate the start and final states and all necessary arrows.



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2. (a) Use the Pumping Lemma to show that the language
- $$\{s \in \{0, 1\}^* \mid s = (01)^i(10)^i \text{ for } i \geq 0\}$$

is

- (b) Show that the language

$$\{s \in \{0, 1\}^* \mid s = (01)^i(01)^i \text{ for } i \geq 0\}$$

is regular.

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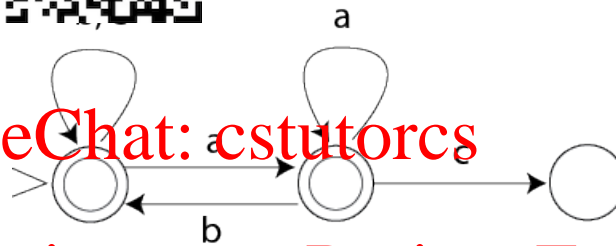
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3. Write a regular expression that expresses the same language as the following finite automaton. It is not necessary to take all the states demanded by the automaton. If you use a non-regular approach (there are shortcuts), you must show that it is not regular.



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4. Write a Context-Free Grammar that expresses the same language as a Regular Expression

$0^*1^*0^*$



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5. (a) $C_1 \cup C_2$ if the operation is closed for the language



	Regular	Context Free
Union		
Intersection		
Complement		

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- (b) Are all Regular languages also Context Free languages?

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Yes	No

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- (c) Given a Context Free language and a Regular language, their intersection can be (check all that apply),

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Regular	Context Free	neither

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