Midterm

There are 5 problems each worth 6 points for a total of 30 points.

As an important protocol for today?s test, please turn your camera?s on. This would help align this class? protocol with those of the other classes at UM. While situations differ, every student is responsible for insuring the integrity of the test, and must take all reasonable steps in support of insuring the integrity.

No notes, no collaboration.

Please sign the cover page so show agreement with these directions.

Name: _____

Problem	Credit
1	
2	
3	
4	
5	
Total	

1. Give an DFA that accepts exactly the strings over the alphabet $\{0, 1\}$ that contain the substring 00101.

2. Give a Context Free Grammar for the language over the alphabet $\{a, b\}^*$ of strings of the form $a^i\, b^j\, a^j\, b^i$ where $i, j \geq 0$.

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3. (a) Check (✓) the box if the operation (Union, Concatentation, etc.) is closed for the language class (Regular or CFL).

	Reg. Lang.	CFL's
Union		
Concatenation		
Star		
Intersection		
Complement		

(b) Are all Regular Languages also Context Free Languages?

Yes	No

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(c) Is the intersection of a CFL with a Regular language necessarily (check all that apply),

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Regular	CFL	neither

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4. Give a Regular Expression for the language over $\{\,a,b\,\}^*$ for strings that contain an even number of a's and an odd number of b's.

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5. Prove that the language,

$$a^+ b^i c^i \cup b^* c^*$$

for $i \geq 0$, is not regular.

First show that *the pumping lemma fails* to show this language is non-regular, when applied in a straight forward manner.

Then take a step to distill the non-regularity and apply the pumping language to the derived problem.

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