

Name (PRINTED): _____		
University ID #: _____		
Circle your TA's name:	Martin	Guilherme
Circle your discussion time:	12:00	1:00

CMSC 330

Exam #1

Spring 2006

Do not open this exam until you are told. Read these instructions:

1. This is a closed book exam. **No notes or other aids are allowed.** If you have a question during the exam, please raise your hand. Each question's point value is next to its number.
2. **You must turn in your exam immediately when time is called at the end.**
3. 6 pages, 5 problems, 100 points, 50 minutes.
4. In order to be eligible for as much partial credit as possible, show all of your work for each problem, and **clearly indicate** your answers. Credit **cannot** be given for illegible answers.
5. You will **lose credit** if **any** information above is incorrect or missing, or your name is missing from any side of any page.
6. Parts of this page and of two other pages are for scratch work. If you need extra scratch paper after you have filled these areas up, please raise your hand. Scratch paper must be turned in with your exam, with your name and ID number written on it. Scratch paper **will not** be graded.
7. To avoid distracting others, **no one** may leave until the exam is over.
8. The Campus Senate has adopted a policy asking students to include the following handwritten statement on each examination and assignment in every course: "*I pledge on my honor that I have not given or received any unauthorized assistance on this examination.*" Therefore, **just before turning in your exam**, you are requested to write this pledge **in full** and **sign it** below:

Good luck!

SCRATCH WORK AREA
(this area will not be graded)

1	2	3	4	5	Total

2. [24 pts.] Draw a valid, complete, deterministic finite automaton (DFA) which recognizes or accepts the language:

$$\{ w \mid w \in \{a, b\}^*, \text{ and the } \mathbf{second-to-last} \text{ symbol of } w \text{ is an } a \}$$

Strings in this language can be of any length and can have any number of a 's and b 's, as long as they satisfy the property above. In particular, all the symbols of a string other than the second-to-last one can be anything at all. Note that any string which doesn't have a second-to-last character can never have this property. Some examples are:

- The strings $aaaaa$, $bbbab$, and $babab$ are all in this language, since the second-to-last symbol of each of them is an a .
- The strings $bbbb$, $aaaba$, and $ababa$ are all **not** in this language, since none of them have a second-to-last symbol which is an a .

Note these examples do **not** illustrate all possible valid or invalid strings.

Be sure to give a **complete** DFA, not an NFA, and **do not use any notational shortcuts**. **Write neatly** for your answer to be graded.