Compiler Theory CS447a: Quiz 1. **UWO, September 30, 2004.**

Student ID number:

Guidelines. The quiz is closed book and all notes are forbidden. The duration of the quiz is 40 minutes. All answers should be written in the *answer boxes*. No justifications for the answers are needed. You are expected to do this quiz on your own without assistance from anyone else in the class. If possible, please avoid pencils and use pens with dark ink. Thank you.

Exercise 1. Complete the first two sections of the following LEX program such that it generates a scanner which counts the number of characters and the number of lines in its input file. This scanner produces no output other than the final report on the counts.

Answer 1

```
%%





%%


main()
     {
     yylex();
     printf( "# of lines = %d, # of chars = %d\n",
            num_lines, num_chars );
}
```

Exercise 2. Give a deterministic automaton that recognizes the same language as the non-deterministic finite automaton shown on Figure 1

Answer 2

Exercise 3. We consider the alphabet $\Sigma = \{a, b\}$. For each of the following languages over Σ give an automaton (deterministic or not) that recognizes this language.

1. L_1 is the language consisting of all words w over Σ such that w is not the empty word and none of the words aa, bb is a factor of w.

2. $\overline{L_1}$ is the language consisting of all words w over Σ such that w is the empty word or one of the words aa, bb is a factor of w.

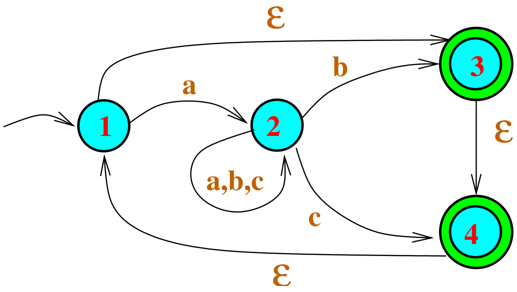

Figure 1: A non-deterministic finite automaton with instantaneous transitions.

Answer 3

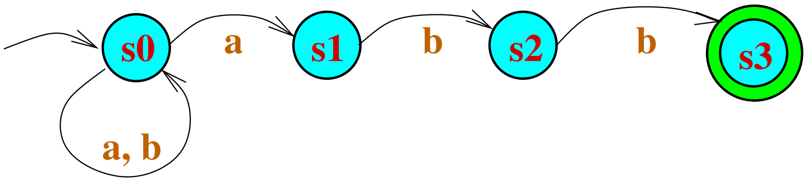

Figure 2: An automaton.

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Exercise 4. Write a LEX program that recognizes the same language as the non-deterministic finite automaton shown on Figure 2. It is up to you to design how the generated scanner works and what it should return.

Answer 4