

Half-Test 2 for CS 3350 Automata, Fall 2025

Let us consider a finite automaton A that has two states: the start state a which is also final, and the state b . If we read 0, we stay in the same state. If we read 1, we change the state.

1. Use the general algorithm to transform this automaton into a context-free grammar. Show how the word 1010 will be accepted by this grammar. Show how this word will be represented as $uvxyz$ according to the Pumping Lemma for context-free grammars.
2. Use a general algorithm to construct a (non-deterministic) pushdown automaton that corresponds to the grammar from Problem 1. Show, step by step, how the word 1010 will be accepted by this pushdown automaton.
3. Use the general algorithm to transform the grammar from Problem 1 into Chomsky normal form.
4. Give an example of an ambiguous grammar and explain, on an example, why this grammar is ambiguous. Also explain why this is not good for compiling.
- 5–6. Let us consider the language L of all the words that (1) have equal number of letters a , b , and c , (2) do not start with the letter a , and (3) do not end with the letter c . Prove that this language is not context-free.