

Mid-term 1 Exam: CSC 340

Instructor: Dr. Abdelouahid Derhab

Student Name:

Student Number:

Exercise 1

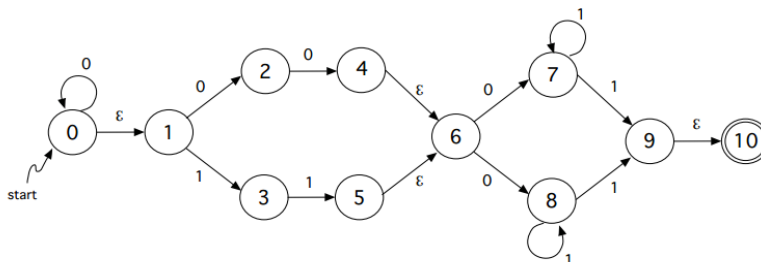
Consider the following two grammars

1. $E \rightarrow (E + E | number$
2. $E \rightarrow E(+E | number$

Which of these grammars, if any, is ambiguous? Prove your answer by showing two distinct derivations of some input string for the ambiguous grammar(s).

Exercise 2

Consider the Non-Deterministic Finite Automaton (NFA) depicted below.



1. Explain why this automaton is non-deterministic?
2. Do the sentences $w_1 = 1101$ and $w_2 = 10$ belong to the language generated by this NFA? Justify.
3. Convert the NFA to a DFA.

Exercise 3

Consider the grammar given below:

$$A \rightarrow [B, A] | B$$

$$B \rightarrow C | (A)$$

$$C \rightarrow x | y | z$$

1. What are the nonterminal symbols in this grammar?
2. What are the terminal symbols in this grammar?
3. What is the start symbol?
4. Draw a parse tree for the sentence (x) .
5. Draw a parse tree for the sentence $[(x), [y, x]]$.

Exercise 4

Convert the following regular expressions to nondeterministic finite automata.

1. $a^*(b|c)^*c$
2. $((b|a)^*(c|a))^*(cb)^*$

Exercise 5

The comments in Pascal language allow the following comment format `{...}`. It means that they start with `{` and end with the first occurrence of `}`. Write the Deterministic Finite Automaton (DFA) that recognizes this comment.