EXERCISES ABOUT NON-DETERMINISTIC FINITE AUTOMATA (NFAS)

1 Obtain NFAs for the following languages, trying to take the maximum advantage of non-determinism: ☚

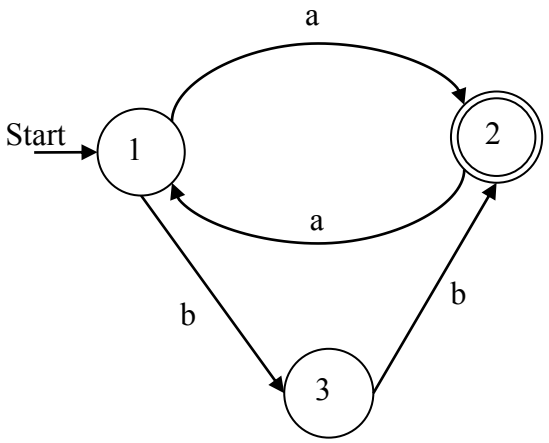
a) The set of all strings over the alphabet {0, …, 9} such that the last digit hasn't appeared before.

b) The set of all the possible strings over the alphabet {0,1} such that there are two 0's separated by a number of positions multiple of 4. Note that zero is considered a multiple of 4.

2 Convert the following NFA into a DFA. ☚

	0	1
→ p	{q,s}	{q}
*q	{r}	{q,r}
r	{s}	{p}
*s	∅	{p}

3 Consider the following automaton: ☚



a) Considering the automata you have studied, how do you classify it?

b) Convert this automaton to an equivalent DFA.

c) Being L the language of the automaton above, obtain an automaton to recognize the complement of L. Justify.

4 Indicate if each of the following sentences is true or false: ☚

a) It is always possible to transform a NFA to an equivalent DFA.

b) A DFA with n states is only able to recognize strings with length ≤ n.

5 Consider the following NFA (see Exercise 2) ☚

	0	1
→ p	{q,s}	{q}
*q	{r}	{q,r}
r	{s}	{p}
*s	∅	{p}

Obtain the automaton for the complement of the language represented by the automaton.

6 A statement says that, if N is an NFA in which for each state and input symbol there is one state at maximum then the equivalent DFA obtained by the construction of subsets has exactly the states and transitions of N plus the transitions to a new state, the dead state, whenever in each state in N there are missing transitions from that state over the symbols from the alphabet. Prove this statement.