German University in Cairo
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CSEN 1003 Compiler, Spring Term 2020
Practice Assignment1

Discussion: 02.02.20 - 05.02.20

Exercise 1-1

Answer the following general questions:

a) What are the advantages of an interpreter over a compiler?

b) What are the advantages of a compiler over an interpreter?

Exercise 1-2

DFA Design

Give state diagrams of DFAs recognizing the following languages. The alphabet is $\{0, 1\}$

a) $\{w|$ w begins with a `1` and ends with a `0`$\}$

b) $\{w|$ w contains the substring `0101`$\}$

c) $\{w|$ every odd position of w is a `1` $\}$

d) $\{w|$ w contains at least two `0`s and at most one `1`$\}$

Exercise 1-3

Regular expressions

Give regular expressions generating the languages of Exercise 1-2

Exercise 1-4

Regular expressions

Describe the set of patterns (ie. The language) denoted by the following regular expressions:

a) $(a|b)^*(a|b)$

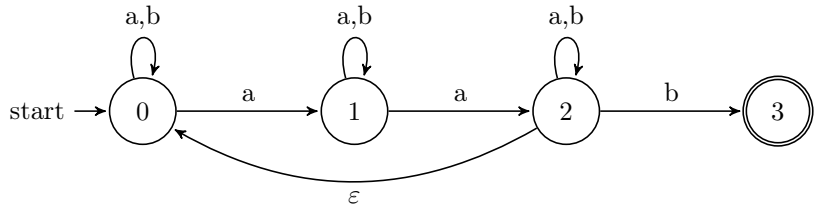
b) $a(a|b)^*a$

c) $((\varepsilon|a)b^*)^*$

[0]The exercises are due to Dr. Carmen Gervet and Sipser's "Introduction to the Theory of Computation".

Exercise 1-5

Consider the following NFA:



a) Indicate all the paths labeled: `aabb`

b) Indicate all the accepting paths labeled: `aabb`

Exercise 1-6

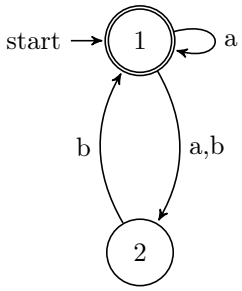
Convert the following regular expression to NFA.

$$(0 \cup 1)^*000(0 \cup 1)*$$

Exercise 1-7

Convert the following NFAs to equivalent DFAs

a)



b)