531 2013-02-19

Note Title 2013-02-19

Midterm will be on Tuesday, February 26, 2013.

HW4: Exercises 4.1 – 4.4, 4.9, and 4.10 [Watt],
due on 2013-02-26.

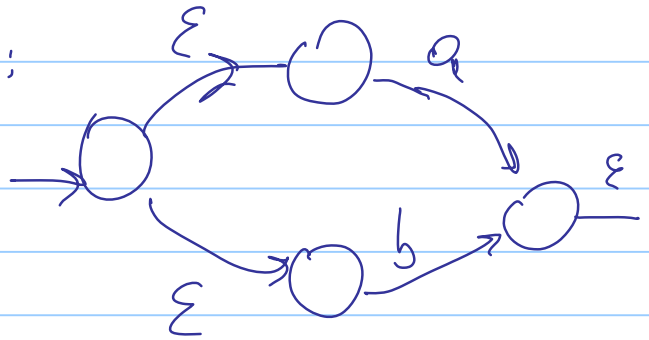
Correction of HW3 (Ex. 2.3 in Mogensen's book).
Part (a). Use the method in section 2.4 to
construct an NFA equivalent to the RE
$((a|b)(a|bb))^*$

The method of section 2.4 is the construction method.

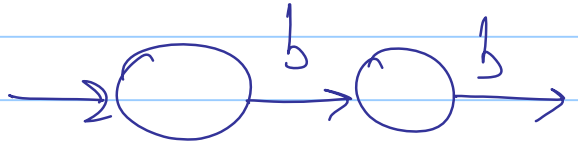
a:

b:

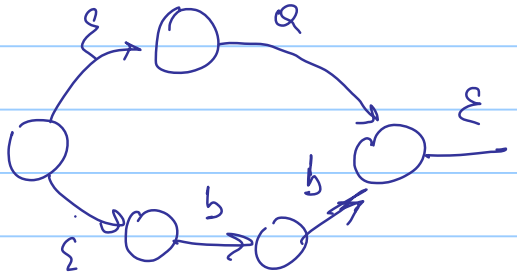
a|b:



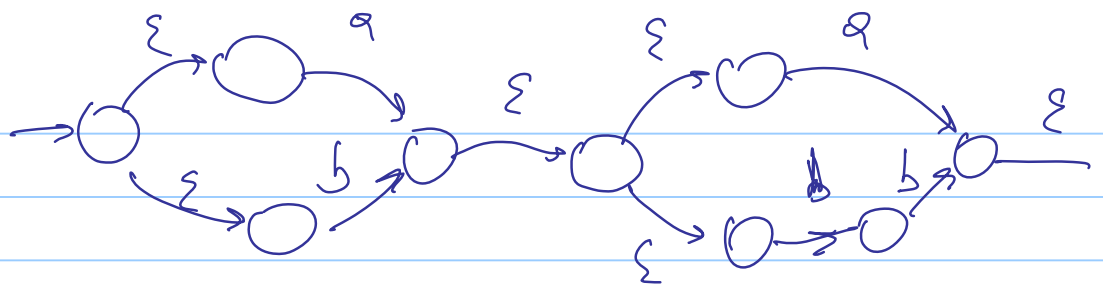
bb:



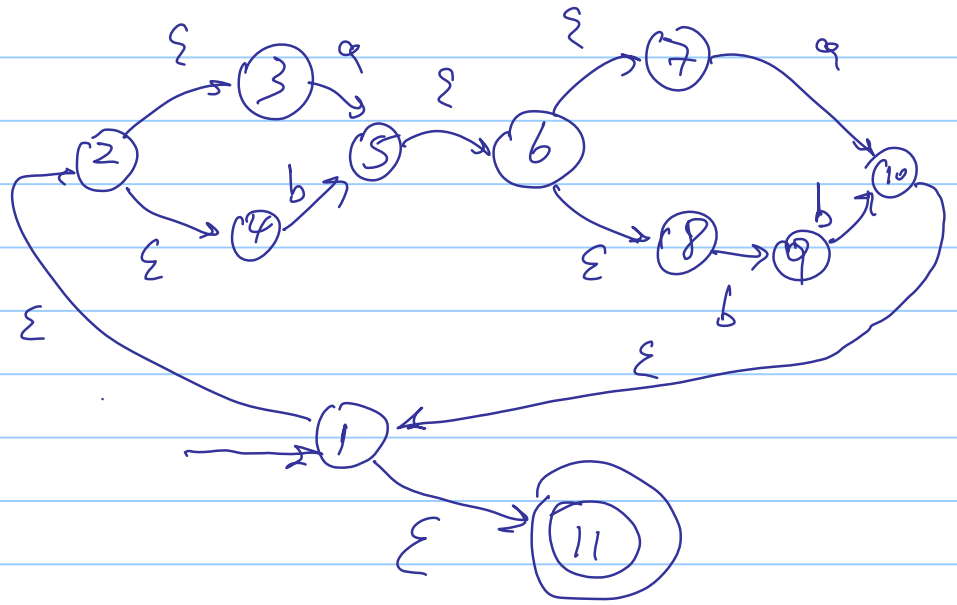
a|bb:



$(a|b)(a|bb)$:



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



Part (b): Convert the NFA from part (a) to a DFA using algorithm 2.3 ("the subset construction").

$A = S_0' = \varepsilon\text{-closure}(\{1\}) = \{1, 2, 3, 4, 11\}$

$B = move(A, a) = \varepsilon\text{-closure}(\{5\}) = \{5, 6, 7, 8\}$

$move(A, b) = \varepsilon\text{-closure}(\{5\}) = \{5, 6, 7, 8\} = B$

$D = move(B, b) = \varepsilon\text{-closure}(\{9\}) = \{9\}$

$C = move(B, a) = \varepsilon\text{-closure}(\{10\}) = \{10, 1, 2, 3, 4, 11\}$

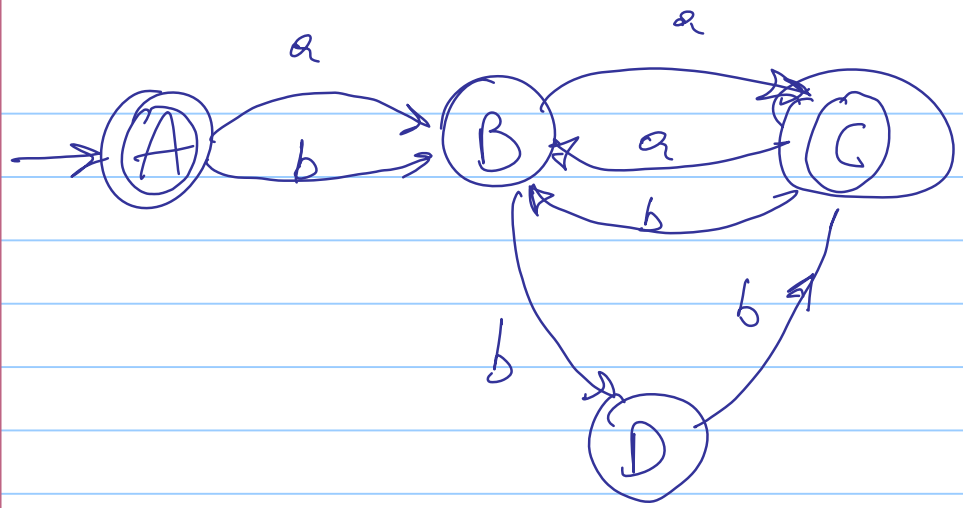
move(C, a) = ε-closure({5}) = B

move(C, b) = ε-closure({5}) = B

move(D, a) = ε-closure({}) = {}

move(D, b) = ε-closure({10}) = C

States A and C are accepting. The DFA equivalent to the previously constructed NFA is.



Examples of recognized strings are:

ε, a a, b a, a b b,

a bb aa

(a|b) (a|bb) (a|b) (a|bb)

a a b a

(a|b) (a|bb) (a|b) (a|bb)

Is this a minimal automaton?

Algorithm 2.4 in Section 2.8 [Rosen] can be used to answer this.

$G_1 = \{A, C\}$ (accepting states)

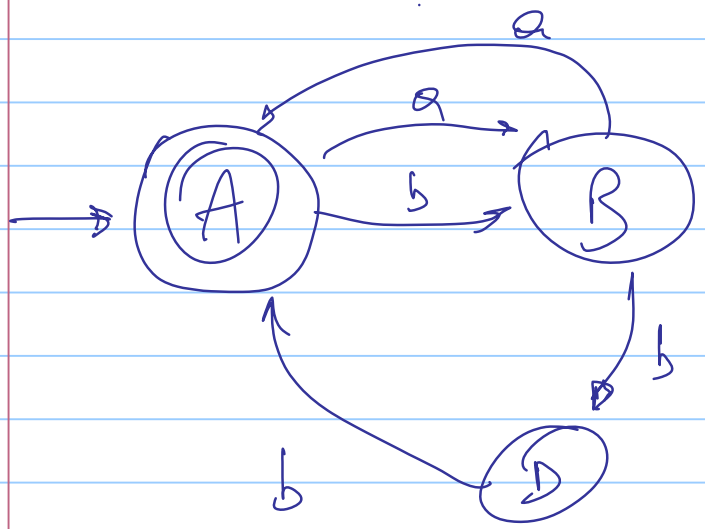
$G_2 = \{B, D\}$ (non-accepting states)

G_1	a	b
A	G_2	G_2
C	G_2	G_2

are equivalent

q_2	a	b
B	q_1	q_2
D	–	q_1

B and D are not equivalent



This recognizes

ε, aa, ba, abb,

abbaa, aabaa.