

For this homework assignment, submit your answers on paper at the start of the lecture on the due date.

Late homework assignments will not be accepted, unless you have a valid written excuse (medical, etc.). You must do this assignment alone. No team work or "talking with your friends" will be accepted. No copying from the Internet. Cheating means zero.

Consider an alphabet made only of the input symbols a and b. Then consider the following regular expression over this alphabet:

$aba^*(a|b)a$

1) Use Thompson's Construction Method to construct an NFA that recognizes the strings that are in the language defined by the regular expression above. Explain step by step how you construct the NFA.

2) Number the states of the NFA with numbers 0, 1, 2, etc., using a top-down first and then left-right order (start from the left, moving towards the right; when two states are one above the other, number the top state first, then the bottom state, then the other remaining states on the right using again the same top-down first and then left-right order).

Then explain step by step what happens when the NFA is given the following input string: abb

Then explain step by step what happens when the NFA is given the following input string: abaa

3) Use the Subset Construction Algorithm to convert the NFA into a DFA. Explain each step of the construction, including the computation of epsilon-closures.

4) Take the DFA you constructed in Question 3 and number the states with numbers 0, 1, 2, etc., using a top-down first and then left-right order.

Then write the transition table for the DFA.

Then explain step by step what happens when the DFA is given the following input string: abb

Then explain step by step what happens when the DFA is given the following input string: abaa

Compare these last two results with the results of Question 2.