CS323 Assignment 2

1 Requirements

You are expected to complete all required homework exercises and encouraged to complete the optional ones (if there are). For submission, please put all your answers in a single PDF file and submit it via the assignment channel on Blackboard. The name of the file should follow the format **"studentID_A#"** (e.g., 30003554_A2). **The submission deadline is 10:00 PM, October 13, 2024.** Late submissions are allowed within one week after the deadline (grace period). If you submit your assignment during the grace period, your score will be 80% of the score you could get if the submission was made in time. Assignment submitted after the grace period will not be graded.

2 Required Exercises (100 points)

You have seen the following two regular expressions in the previous assignment. Now you are required to complete two exercises related to the languages represented by the two regular expressions. The alphabet contains three symbols: `a`, `b`, `c`.

1. `a(ba)*c`
2. `ba+|ab*`

Exercise 1: Convert the above two regular expressions to NFAs using the Thompson's Construction Algorithm (Algorithm 3.23 in the dragon book). Please put down the detailed steps and **DO NOT** optimize the NFAs. [50 points]

Exercise 2: Convert the NFAs constructed in Exercise 1 to DFAs using the Subset Construction Algorithm (Algorithm 3.20 in the dragon book). Please put down the detailed steps and **DO NOT** optimize the DFAs. [50 points]

3 Optional Exercises (20 bonus points)

Exercise 1: Please pick a DFA you have constructed for the above two languages and follow the State-Minimization Algorithm (Algorithm 3.39 in the dragon book) to minimize the number of states in the DFA. There might be chances that the built DFA is already minimum and in that case you should justify why it is already minimum. Note that the algorithm is not covered during lectures and you need to study it by yourself.