Homework Two
Theory of Computation 2021

Important Note:
   The deadline is 18:00, 11/19 (Friday). Please take your handwriting pages to lab 65602 or upload your HW to moodle (Please make sure the resolution is good to read for TAs. It is your responsibility).

   Note that Penalty for late submission: 20% per day, and you can only upload HW to moodle after the deadline.
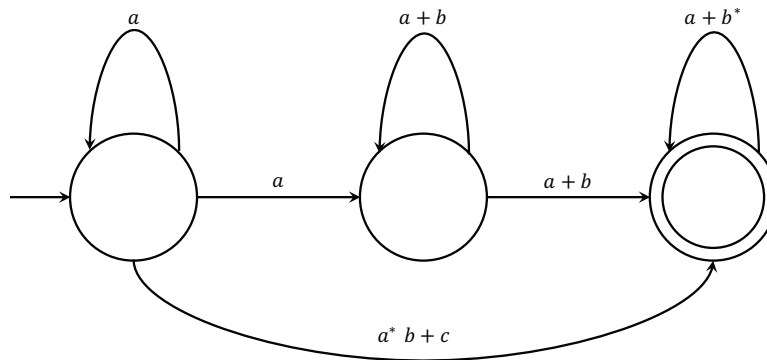
Q1: Find all strings in $L((a + bb)^*)$ of length five.
Q2: Find an nfa that accepts the languages $L(aa^*(ab + b))$.
Q3: Find a regular expression for the set $\{a^n b^m : n \geq 3, m \text{ is odd}\}$.
Q4: Use the construction in Theorem 3.1 to find an nfa that accepts the language $L((aab)^*ab)$.

Q5: What language is accepted by the following generalized transition graph?

Q6: Find a regular expression for the following language on $\{a, b\}$:
   $L = \{w : n_a(w) \text{ and } n_b(w) \text{ are both odd}\}$.
Q7: Construct a dfa that accepts the language generated by the grammar

$$S \to abA,$$
$$A \to baB,$$
$$B \to aA|bb.$$

Q8: Find a regular grammar that generates the language on $\Sigma = \{a, b\}$ consisting of all strings with no more than two a's.
Q9: Prove that the following language is not regular:
   $L = \{a^n b^l a^k : k \leq n + l\}$.
Q10: Prove that the following language is not regular:
   $L = \{a^n : n \geq 2, \text{ is a prime number}\}$.