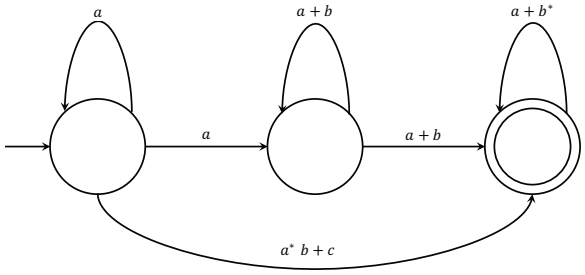
Homework Two

Theory of Computation 2022

Important Note:

Please remember that you should return your answer at 11/02 (Wednesday) 15:10 and your HW should be handwritten. We will take your HW during the class. After 11/02 15:10, you must upload your HW to moodle. But remember penalty for late submission: 20% per day.

Q1: Find all strings in $L((ab+b)^*b(a+ab)^*)$ of length less than five.
Q2: Find an nfa that accepts the languages $L(aa^*(a+b))$.
Q3: Find a regular expression for the set $\{a^n b^m : (n+m) \text{ is odd}\}$.
Q4: Use the construction in Theorem 3.1 to find an nfa that accepts the language $L(a^*a+ab)$.
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.
$L = \{a^n b^k c^n : n \geq 0, k \geq n\}$.
Q10: Determine whether or not the following language is regular.
$L = \{a^n : n = k^3 \text{ for some k} \geq 0\}$.