Homework Two

Theory of Computation 2016

Important Note:

Please remember that you should return your answer at 4/14 (Thursday) 6:10pm. We will take your HW during the class. Please handwriting the answer. After 4/14 6:10pm, you must upload your HW to moodle. But remember penalty for late submission: 20% per day.

Q1: Find an nfa that accepts the languages $L(aa^*(ab+b))$.

Q2: Find a regular expression for the set $\{a^n b^m : n \geq 3, m \text{ is odd}\}$.

Q3: Give regular expressions for the following languages.

(a) $L_1 = \{a^n b^m : n \geq 3, m \leq 4\}$.

(b) $L_2 = \{a^n b^m : n < 4, m \leq 4\}$.

(c) The complement of L_1.

(d) The complement of L_2.

Q4: Write regular expressions for the following languages on $\{0, 1\}$:

(a) All strings ending in 10.

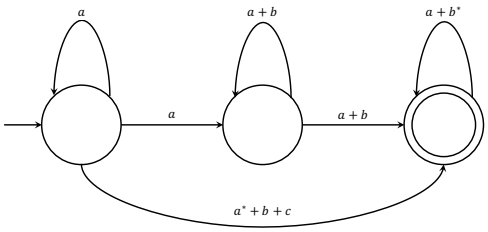
(b) All strings not ending in 10.

(c) All strings containing an odd number of 0's.

Q5: Use the construction in Theorem 3.1 to find an nfa that accepts the language $L(a^*a + ab)$.

Q6: Give an nfa that accepts the language $L((a+b)^*b(a+bb)^*)$.

Q7: What language is accepted by the following generalized transition graph?



Q8: Find a regular expression for the following languages on $\{a, b\}$.

(a)$L = \{w : n_a(w) \text{ and } n_b(w) \text{ are both odd}\}$.

(b)$L = \{w : (n_a(w) - n_b(w)) \bmod 3 = 2\}$.

(c)$L = \{w : (n_a(w) - n_b(w)) \bmod 3 = 0\}$.

(d)$L = \{w : 2n_a(w) + 3n_b(w) \text{ is even}\}$.

Q9: Construct a dfa that accepts the language generated by the grammar

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

Q10: Find a regular grammar that generates the language on $\Sigma = \{a, b\}$ consisting of all strings with no more than two a's.