

## Assignment 1

### Regular Expressions and Finite Automata Due October 17, Wednesday, 2012

1. (30%) Consider the following regular expression  $(\epsilon \mid a)^* \mid b^+$ .
  - (a) (15%) Give the expression tree for this regular expression. The precedence of operator '+' is the same as operator '\*'.
  - (b) (15%) Give the set representation for the language at each node of the expression tree.
  
2. (20%) Give a regular expression to define the following language:  
{a, ac, abc, abbc, abbbc, abbbbc, ...}.
  
3. (50%) Consider the following nondeterministic finite automaton,

States \ Inputs	a	b	$\epsilon$
0	{0, 1}		
1		{2}	
2			{3, 4}
3	{3}		{5}
4		{4}	{5}
5	{6}		
6	{7}	{6}	
7			

where state 0 is the start state and state 7 is the only final state. The blank entry in the table represents the empty set.

- (a) (30%) Simulate this NFA using the  $\epsilon$ -closure and move functions with respect to the input strings abaaaba and aabbbbaa.
- (b) (20%) Give a regular expression for the language accepted by this NFA.

To turn in this assignment, upload a pdf file hw1.pdf that contains the solutions for this assignment to the eCourse site.