

Foundation of Computer Science (CS60001)

Tutorial-02

August 11, 2010

1. Construct a DFA that will accept the following languages over the alphabet $\{0, 1\}$
 - (a) The set of all strings whose binary interpretation is divisible by three.
 - (b) All strings that start with 0 and has odd length or start with 1 and has even length.
 - (c) The set of all strings with an equal number of 0's and 1's, such that no prefix has two more 0's than 1's, nor two more 1's than 0's.
 - (d) The set of all strings with no of 0's divisible by 3 and no of 1's divisible by 2.
 - (e) All strings containing exactly three 0's and at least two 1's.
2. Write regular expressions for the following languages
 - (a) The set of all strings of 0's and 1's whose fourth symbol from the right end is 1.
 - (b) The set of all strings with an equal number of 0's and 1's, such that no prefix has two more 0's than 1's, nor two more 1's than 0's.
 - (c) The set of all strings of 0's and 1's whose number of 0s divisible by three.
 - (d) The set of all strings of 0's and 1's with at most one pair of consecutive 1's.
 - (e) The set of all strings of 0's and 1's with at least one 0 and one 1.
3. Use the pumping lemma to show that the following languages are not regular
 - (a) $L_1 = \{ww^R \mid w \in \{a,b\}^*\}$.
 - (b) $L_2 = \{a^{i^2} \mid i \geq 1\}$.
 - (c) $L_3 = \{a^p \mid p \text{ is a prime number}\}$.