
Tutorial (10/15)

Topics covered: 4.1 Pumping Lemma, 4.2 Closure Properties of Regular Languages

Problems solved in class:

Exercise 0.1 Use the pumping lemma to prove the following languages are NOT regular:

1. $\{0^n 1^n : n \geq 1\}$
2. $\{0^n 10^n : n \geq 1\}$
3. $\{0^n : n \text{ is a power of } 3\}$.
4. The set of strings of 0's and 1's of the form $w^R w$, where w^R is the reverse of w .
5. $\{0^n : n \text{ is prime}\}$.
6. !! The set of strings of 0's and 1's, beginning with a 1, such that when interpreted as an integer, that integer is prime.
7. !! The set of strings of form $0^i 1^j$ such that $\gcd(i, j) = 1$.

Exercise 0.2 !! Show that the regular languages are closed under the cycle operation, where given a regular language L , $\text{cycle}(L) = \{w : w = xy, \text{ such that } yx \in L\}$.