School for Computer Science and Information Technology

Machines and their languages (G51MAL) Spring 2004

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4th Coursework

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Apply the pumping lemma for regular languages to show that the following languages are not regular:

1. We use $\Sigma_1 = \{\mathrm{a}, \mathrm{b}, \mathrm{c}\}$ and

   $$L_1 = \{\mathrm{a}^n\mathrm{b}^m\mathrm{c}^{n+m} \mid m, n \in \mathrm{Nat}\}$$

   I.e. aabbbccccc $\in L_1$ but aabbcc $\notin L_1$

2. We consider the language of repetitions over $\Sigma_2 = \{0, 1\}$ that is

   $$L_2 = \{ww \mid w \in \Sigma_2^*\}$$

   I.e. $011011 \in L_2$ (using $w = 011$) but $01010 \notin L_2$ (because it cannot be read as a repetition).

   What happens if we consider $\Sigma = \{1\}$ instead?