< Lecture 11 >

- What is a regular language?
- Are there non-regular languages?
- What distinguishes them?
- How do we prove that a language is non-regular?

Guess!
Examples of non-regular languages

- $\{0^n 1^n \mid n \geq 0\}$
- $\{ww \mid w \in \{0,1\}^*\}$
- the set of the palindromes

- $\{w \in \{0,1\}^* \mid w$ has an equal # of zeros and ones$\}$
- $\{w \mid w$ has an equal # of occurrences of 01 and 10 as substrings$\}$

Pumping Lemma : Simplified (but not complete)

Let A be a regular language. Any "long" string s from A can be divided into three pieces $s = xyz$, so that

1. $xyyz \in A$
2. $|y| > 0$ (i.e., $y \neq \varepsilon$)

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Example: $\Sigma = \{a, b\}$

$\{ w \mid w$ has at least 2 a's $\}$