Non Context-Free Languages – Lecture 12

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Theorem

The class of context-free languages is closed under the regular operations

The proof of this is an exercise for this week's problems class

Theorem – The pumping lemma for context-free languages

For a context free language A there exists a *pumping length* p where any string $s \in A$ of length at least p can be divided into 5 pieces $s = uvxyz$, such that

1. $\forall i \geq 0, uv^i xy^i z \in A$
2. $|vy| > 0$
3. $|vxy| \leq p$

Regular Languages, Context Free Languages, and other Languages

Example

$A = \{0^n 1^n \mid n \geq 0\}$ *is* context-free

Example

$B = \{a^n b^n c^n \mid n \geq 0\}$ *is not* context-free

Example

$D = \left\{ww \mid w \in \{0,1\}^*\right\}$ *is not* context-free