Context-Free Languages (Section 11.5)

Context-Free Languages

- We know that the language $\{a^n b^n | n \in \mathbb{N}\}$ is not regular. It has a non-regular grammar, such as
  - $S \rightarrow aSb|\Lambda$
- A *context-free grammar* has productions of the form:
  - $N \rightarrow w$

  where N is a nonterminal and w is any string containing terminals or non-terminals.
- A *context-free language* is the set of strings derived from a context-free grammar.

Examples

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- $S \rightarrow aSa|bSb|\Lambda$

One more example

- Consider the language of strings over $\{a, b\}$ with the same number of a's and b's.
- A grammar for this is:
  - $S \rightarrow aSbS|bSaS|\Lambda$