Pumping Lemma for Context-Free Languages

Outline

- Idea and Definition
- Examples

Context-Free Pumping Lemma Idea

Context-Free Pumping Lemma Idea:

- Pumping Lemma is used to prove a language is **NOT** context-free
- There are two pumps now
  - Pumps on two cycles in the PDA to match stack pushes/pops

Theorem: Pumping Lemma for CFLs

If L is a context-free language, there is a number p (the pumping length) where if:

- $\sigma \in$ L
- $|\sigma| \geq$ p

Then we can divide σ into five pieces σ = uvxyz such that:

- |vy| $>$ 0
- |vxy| $\leq$ p
- for each i $\geq$ 0, $uv^ixy^iz \in$ L

Proving a Language is NOT Context-Free Using Pumping Lemma

1. Assume L is context-free
2. Show that some string can be pumped
3. Show when pumped its not valid
4. PROOF BY CONTRADICTION