a, b → c
\[ L_1 = \{ w \mid w \text{ has more } a\text{'s than } b\text{'s} \} \]

\[ w \in \{a, b\}^* \]

\[ L_2 = \{ w \mid w \in \{a, b\}^* \text{ w has the same number of } a\text{'s as } b\text{'s} \} \]

- stack:
Pumping Lemma for CFL's.

\[ V \Rightarrow uVw \quad u, w : \text{strings of} \]
\[ \Rightarrow uuVww \quad \text{vars and terms.} \]

If \( A \) is a context free language, then there is a number \( p \) (the pumping length) where, if \( s \in A \) of length at least \( p \), then \( s \) may be divided into 5 pieces,

\[ s = uvxyz \quad \text{satisfying the conditions:} \]

1. for each \( i \geq 0 \) \( uv^ixy^iz \in A \)
2. \( |vy| > 0 \)
3. \( |vxy| \leq p \)
$L = \{a^n b^n c^n \mid n \geq 0\}$ is not a CFL.

Proof by contradiction

Suppose $L$ is context free.

Let $p$ be the pumping length.

Choose a string $s = a^p b^p c^p$.

So $s$ can be split into 5 pieces, $s = uvxyz$ according to the pumping lemma, because $s \in L$ and $|s| \geq p$.

Since $|vxy| \leq p$, there can be at most 2 symbols in $vxy$.

Therefore $u v^2 x y^2 z$ would have more of one or two symbols than the third so $u v^2 x y^2 z \notin L$, which is a contradiction.

$\therefore L$ is not a CFL.