

$$\{ a^i b^j c^k \mid i=j \text{ or } i=k \}$$

$$\{ a^n b^n c^n \mid n \geq 0 \}$$

$$\{ ww^R \mid w \in \{a,b\}^* \}$$

$$\{ ww \mid w \in \{a,b\}^* \}$$

~~W~~ CFL $A \exists p$ st $\forall w \in A$

if $|w| \geq p$ then $\exists u, v, x, y, z \in \Sigma^*$

st

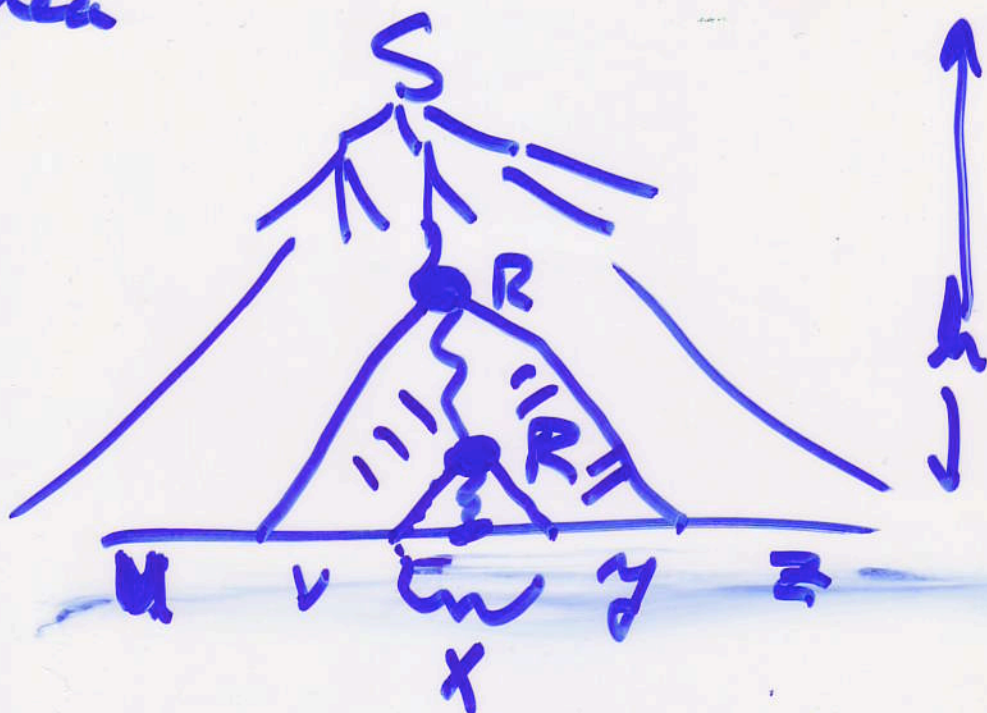
(0) $w = u \cdot v \cdot x \cdot y \cdot z$

(i) $\forall i \geq 0 \quad u v^i x y^i z \in A$

(ii) $|v y| \geq 0$

(iii) $|v x y| \leq p$

Idea



Repeating shaded part i times
gives $u v^i x y^i z \in A$

To Show: $\{a^n b^n c^n \mid n \geq 0\}$
is not CFL.

let p be const from P.L.

$$s = a^p b^p c^p$$

$$s = uvxyz$$

Case 1 $uvxy \in a^*$ but $i=0$ gives
 $a^{n-k} b^n c^n \quad k = |vxy| > 0$

2 v or y includes 2 diff
types of letter

$i=2$ gives string $\notin a^* b^* c^*$

3 $vxy \in b^*$ or c^* like 1

4 $v \in a^*$, $y \in b^*$

$i=0$ ~~A~~ still c^n

5 ditto ~~any~~ any pair a^*, b^*, c^*