

Ex: 2  $L = \{ww \mid w \in \{0,1\}^*\}$

Proof: By contrad, let  $L$  be a CFL

1)

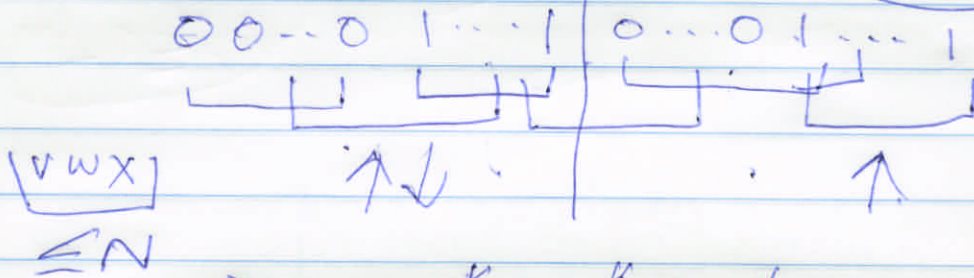
Let  $N \leftarrow P/L$  const

2)  $z_1 = \underbrace{0^N}_{u} \underbrace{0^N}_{y} \in L, |z_1| \geq N$

3)  $z = uvwx^k y$  {  $|vwx| \leq N$   
 $vx \neq \epsilon$  }

$uv^k wx^k z \in L$

2)  $z_2 = \underbrace{0^N 1^N}_{u} \underbrace{0^N 1^N}_{y} \in L, |z_2| \geq N$



$\Rightarrow \underbrace{uv^k wx^k z} \notin L, k \geq 2 \checkmark$   
or  $k=0 \checkmark$

$\downarrow$