Theorem: Let A be a CFL. There exists n>0 such that for every string Z, IZI>nl ZEA, there exists 2,4, u,v,w with luvw/<n, $|uw| \ge 1$, Z = xuvwy, and $xu^ivw^iy \in A$ du i 20. proof: let (ZI, I, P) he a CF a generally A. Without closs of generality, assume that CFG is in Chomskey Normal Form.

productions > A > BC

productions A > a Fix n = 2. Consider ZEA with 121>n. Number of children there must be a path in the tree from root to a leaf with llength > 1 + Total # nodes in the Kee $\leq 1+2+2^{1}+2^{m}$ \[
 \frac{1}{2} = \frac{1}{1}
 \] If m < M+1, then total no of nodes $\leq 2^{|I|/2} < |Z|$. Not possible. therefore, m > 17/+1 => there is a path from root to a node in last layer of length > 17/1+1 $S \rightarrow B_1 \rightarrow B_2 \rightarrow B_3 \rightarrow \cdots \rightarrow B_{m-2} \rightarrow \alpha$ $\# non-terminals = m-1 > |\Gamma|$ At least one non-terminal occurs more than once in the path. Suppose non-terminal C repeats in the path and C is the first non-terminal from right Hot Vepeats. leaves 17171 1uvw1 \le 2 1uw1 \ge 1 Same argument 13