13. $L = \{a^n b^n c^k \mid k \geq n \geq 0\}$

~~If L is regular context-free,~~

~~then $L = C^{k-n}$~~

Two cases:

(1) $L_1 = \{a^n b^n c^n \mid n \geq 0\}$ $(k = n)$

shown in class as non-context-free,

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(2) $L_2 = \{a^n b^n c^k \mid k > n \geq 0\}$ $(k > n)$

If we assume L_2 is ~~regular~~ context-free, then

there is pumping # P.

$w = a^P b^P c^{P+1}$, $w \in L_2$ $\{|w| \geq p$.

~~Then if not let~~

If we pick either a or b for v or y,

then we break either the a/b parity, or

we increase a/b beyond the count of c.

If we pick c_1 then we can pump down,

resulting in $k \leq n$, which

is not a word in L_2.

Contradiction, L_2 cannot be context-free.