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

~~Pick~~

Assume L is a CFL. That means I can pick a word $w = a^p b^p c^p$. $|w| \geq p$ where p is ~~the~~ some pumping length.

~~Horrible.~~

From the pumping lemma, $w = uvxyz$ where

(1) $|vxy| \leq p$

(2) $v \neq \varepsilon$ or $y \neq \varepsilon$

(3) $\forall n$, $uv^n x y^n z \in L$.

(n is whole #)

8 (cont):

Case 1: $|vxy|$ consists only of a's:
→ pump down, resulting in
$a^0 b^p c^p \notin L$

Case 2: $|vxy|$ consists only of b's:
→ pump down, resulting in
$a^p b^0 c^p \notin L$

Case 3: $|vxy|$ consists only of c's
→ pump up, resulting in
$a^p b^p c^{2p} \notin L$.

Case 4: $|vxy|$ consists of b's & c's
→ pump up, resulting in
$a^p b^{2p} c^{2p} \notin L$

Case 5: $|vxy|$ consists of a's & b's
→ pump down, resulting in
$a^0 b^0 c^p \notin L$.

$|vxy| \neq z$ (by 2) & $|vxy| \neq$ a's & c's (by 1).

∴ w cannot be pumped.

→ ∴ L is not context-free.