#3 $L = \{ 0^{K^2} \mid K \text{ is any integer} \}$

Proof:

By contradiction, let L be a CFL

$\Rightarrow$ let $N \leftarrow$ P/L const.

Let $z = 0^{N^2}$ $\quad z \in L$, $|z| \geq N$

We can split $z = uvwxy$ s.t $|vwx| \leq N$

$vx \neq \varepsilon$

$\downarrow$ $K=0$: $uv^0wx^0y = uwy$

$(N-1)^2 \leq N^2-N \leq \#zeros(uwy) \leq N^2-1 < N^2$

$(N-1)^2$ can equal N^2-N if $N=1$ and the adversary may have picked $N=1$

$\Rightarrow$ $K=0$ is not leading to a contradiction

$\uparrow$ $K=2$: uv^2wx^2y

$N^2 < N^2+1 \leq \#zeros(uv^2wx^2y) \leq N^2+N < (N+1)^2$

$\therefore uv^2wx^2y \notin L$ $\lightning$ (contradiction)

$\square$.