

④  $L = \{ww \mid w \in (0+1)^*\}$

$$\underline{0^p 1^p 0^p 1^p}$$

$$\swarrow \text{xyzuv}$$

$$yzv \in 0^p$$

$$yzv \in 1^p$$

$$yzv \in 0^p 1^p$$

$$\hookrightarrow xy^0 z v^0 v$$

Pump:  
 reduce 0  
 reduce 1  
 reduce 0 1

⑤  $L = \{a^i b^j c^k \mid i \leq j \leq k\}$

$$\underline{a^p b^p c^p}$$

⑥  $\{a^p \mid p \text{ is a prime}\}$

$\{a^{n!} \mid n \geq 0\}$

$\{a^{2^n} \mid n \geq 0\}$