

Contrapositive of Pumping Lemma

$\neg (L \text{ regular})$

~~$\Downarrow$~~ $\Uparrow$

$$\neg \left(\exists p \forall s \in L \begin{array}{l} |s| \geq p \\ \exists s = xyz \begin{array}{l} \forall i: xy^i z \in L \\ |y| \geq 1 \\ |xy| \leq p \end{array} \end{array} \right)$$

Logic: Contrapositive: $P \Rightarrow Q \equiv \neg Q \Rightarrow \neg P$

$$\neg \exists x: P(x) \equiv \forall x: \neg P(x)$$

$$\neg \forall x: P(x) \equiv \exists x: \neg P(x)$$

$$\forall p \exists s \in L \begin{array}{l} |s| \geq p \\ \forall s = xyz \begin{array}{l} |y| \geq 1 \\ |xy| \leq p \\ \exists i: xy^i z \notin L \end{array} \end{array}$$

$\Downarrow$

L is not regular