

គគកំរាប់ចុងណាយការ ទី

លក្ខណៈ
សម្រាប់សាស្ត្រ
reg

$i=3, 0^{m+2k} > m \checkmark$ $\times i=1, 0^m 1^m$ $\times i=0, 0^{m-k} 1^m$
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Theory of Computation

Exercise 6: (Pumping Lemma)

Prove by Pumping Lemma that the following languages are not regular.

1. $L_1 = \{ 0^i 1^j : j \text{ is a multiple of } i \}$ $\{ 0^i 1^i, 0^2 1^2, 0^3 1^3, \dots, 0^9 1^9, 0^4 1^4, \dots, 0^8 1^8, 0^7 1^7, \dots \}$

ផ្ទា តួអតិថិជន L_1 មិនជាការ regular

ផ្ទា 2 W: $|w| \geq m$, $w = \underbrace{0^m}_x \underbrace{1^m}_y$ (ការតើត្រូវ)

O: $w = xyz$, $|xy| \leq m$, $|y| \geq 1$ $0 \underbrace{\dots 0}_x \underbrace{\dots 0}_y \underbrace{\dots 1}_z \dots 1$

ផ្ទា 3 តើ $i=2$ ពី pump xy^iz

$$y = 0^k, k \geq 1$$

$$\begin{aligned} xy^2z &= 0 \underbrace{\dots 0}_x \underbrace{\dots 0}_y \underbrace{\dots 1}_z \dots 1 \\ &= 0^{m-k} 0^k 1^m \\ &= 0^{m-k+k} 1^m \\ &= 0^m 1^m, k \geq 1 \text{ ដូចនេះ } 0^m 1^m \notin L \end{aligned}$$

\therefore contradiction តើ Pumping Lemma តាមការ L_1 មិនជាការ regular

กรณีที่ ๖

$$W = 0^m 1^{m+1}$$

2. $L_2 = \{ 0^i 1^j : i < j \}$

กรณี ๑ สมมติ

กรณี ๒ $w \in L_2$, $|w| \geq m$, $w = 0^m 1^{m+1}$

$$w = xyz, |xy| \leq m, |y| \geq 1$$

กรณี ๓ $y = 0^k, k \geq 1$

$$i=2 \text{ pump } xy^iz \Rightarrow 0^{m-k} 0^k 0^k 1^{m+1} = 0^{m+k} 1^{m+1}$$

$$\Rightarrow 0^{m+k} 1^{m+1} \notin L$$

\therefore contradiction ด้วย Pumping Lemma ดังนั้น L_2 ไม่ใช่ภาษา regular

*3. $L_3 = \{ 0^i 1^j : i \geq j \}$

(Homework 5)

ກຳນົດ 1 ສາມາດວ່າ $L_3 = \{ 0^i 1^j : i \geq j \}$ ຜົນລືການ regular

ໃຊ້ m ວິທີກຳນົດກອງ pumping lemma

ກຳນົດ 2 1. ອີ້ວ $w \in L_3$, $|w| \geq m$, $w = 0^m 1^m$

2. ອີ້ວ $w = xyz$, $|xy| \leq m$, $|y| \geq 1$

$\overbrace{0 \dots 0}^m \overbrace{1 \dots 1}^m$
 $\underbrace{\quad}_x \quad \underbrace{y} \quad \underbrace{\quad}_z$

ກຳນົດ 3 ອີ້ວ $i=2$ pump $xy^i z$, ອີ້ວ $y = 1^k$ ໂດຍຕໍ່ $k \geq 1$ ດັ່ງນີ້ $x = 0^{m-k}$

$$\text{ຄະດີ } 0^{m-k} 1^k 1^m = 0^{m-k} 1^{m+2k}$$

ສິ້ງ $0^{m-k} 1^{m+2k} \notin L_3$

\therefore contradiction ມີ Pumping Lemma ຕັ້ງນີ້ L_3 ຜົນລືການ regular

3. $L_3 = \{0^i 1^j : i \geq j\}$

ກົດຕົວ 1 ລວມຕົວ $L_3 = \{0^i 1^j : i \geq j\}$ ດັວນດາມວ່າ regular
ກົດຕົວ m ມີຫົວໜ້າກຳນົດ pumping lemma

ກົດຕົວ 2 1. ກົດ $w \in L_3$, $|w| \geq m$, $w = 0^m 1^m$

2. ກົດ $w = xyz$, $|xy| \leq m$, $|y| \geq 1$

$\overbrace{0 \dots 0}^m \overbrace{1 \dots 1}^m$
 $\sqcup_x \sqcup_y \sqcup_z$

ກົດຕົວ 3 ກົດ $i=2$ pump xy^iz , ກົດ $y = 1^k$ ໂສມ່ $k \geq 1$ ດັວນ $x = 0^{m-k}$

$$0^{m-k} 1^k 1^k 1^m = 0^{m-k} 1^{m+2k}$$

$$\therefore 0^{m-k} 1^{m+2k} \notin L_3$$

\therefore contradiction ໂສມ່ Pumping Lemma ດັວນ L_3 ດັວນດາມວ່າ regular