

# CIT 596 Recitation, Week 5

Honglin Zhang

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# Usage of Pumping Lemma

Jean Gallier says in his Notes:

*"In order to show that the pumping lemma is contradicted, one needs to show that for some DFA  $D$ , for every  $m \geq 1$ , there is some string  $w \in L(D)$  of length at least  $m$ , such that for every possible decomposition  $w = uxv$  satisfying the constraints  $x \neq \epsilon$  and  $|ux| \leq m$ , there is some  $i \geq 0$  such that  $ux^i v \notin L(D)$ ."*

# [Exercise] @sipser13 [p. 88-91] exercise 1.29, exercise 1.46

Determine if the following language is regular or not.

- ▶  $\{0^n 1^n 2^n \mid n \geq 0\}$
- ▶  $\{a^{2^n} \mid n \geq 0\}$
- ▶  $\{0^m 1^n \mid m \neq n\}$

## [Exercise] @sipser13 [p. 90] exercise 1.45

- ▶ Let  $A/B = \{w \mid wx \in A \text{ for some } x \in B\}$ . Show that if  $A$  is regular and  $B$  is any language, then  $A/B$  is regular.