

# Tutorial 04

UNIVERSITY OF VICTORIA

CSC 320 - SPRING 2023

FOUNDATIONS OF COMPUTER SCIENCE

Teaching Team

Learning Outcomes:

- Understand the Pumping Lemma.
- Prove that a language is not regular using the Pumping Lemma.

Interesting Article:

"Pumping Lemma for Quantum Automata" [1]

February 7th, 2023

### Question 4.01

Prove that the following language is not regular using the pumping lemma.

$$L_1 = \{0^n 1^n 2^n \mid n \geq 0\}$$



### Question 4.02

Prove that the following language is not regular using the pumping lemma.

$$L_2 = \{w^r w \mid w \in \{0, 1\}^*\}$$



## Reflection on Question 4.02

Why is the string  $s = 0^P 0^P$  not a good choice to devise a contradiction to prove  $L_2$  is not regular?



# Bibliography

- [1] R. Lu and H. Zheng, “Pumping Lemma for Quantum Automata,” English, *International journal of theoretical physics*, vol. 43, no. 5, pp. 1191–1217, 2004, ISSN: 0020-7748.