## KING SAUD UNIVERSITY COLLEGE OF COMPUTER AND INFORMATION SCIENCES DEPARTMENT OF COMPUTER SCIENCE

## Theory of Computation (CSC 339) - Fall 2023

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## **Tutorial 4: Pumping Lemma**

- 1. Use the pumping lemma to show that the following languages are not regular.
  - (a)  $A_1 = \{0^n 1^n 2^n | n \ge 0\}.$
  - (b)  $A_2 = \{a^{2^n} | n \ge 0\}, a^{2^n} \text{ is a string of } 2^n \text{ a's.}$
- 2. For each of the following languages, give the minimum pumping length and justify your answer.
  - (a) 0001\*
  - (b) 0\*1\*
  - (c)  $0*1^+0^+1* + 10*1$
- 3. Prove that the following language is not regular:  $\{0^m1^n|m\neq n\}$ .